ENVH/EPI 570 Spring, 2013

Tuesday and Thursday, 11:00-12:20
Health Sciences Building, Room T-531

Instructor:
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Office hours: No scheduled office hours. Students can contact instructors or TA by phone or e-mail, or visit their offices on a drop-by or appointment basis.

Course administration:
Mary Saucier;
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Course web site: http://courses.washington.edu/envh570/

Prerequisites:

Previous introductory course in epidemiology (e.g., EPI 511, 512, 513) or permission of instructor.

Course overview:

This course offers an overview of selected important topics in occupational and environmental epidemiology. Epidemiologic methods for studying occupational and environmental determinants of disease will be presented in the context of studies of specific health outcomes, including: cancer, non-malignant respiratory diseases, adverse reproductive outcomes, and neurologic diseases. Emphasis will be placed on the most suitable epidemiologic approaches to characterize exposure-response associations for various occupational and environmental diseases. By the end of the course, students should gain sufficient understanding of epidemiologic techniques to facilitate their comprehension of published epidemiologic literature and, in some instances, designing and conducting original research.

Learning objectives:

1. Critically review literature for in-class discussion.

2. Understand the most suitable epidemiologic study designs for investigating specific exposure/disease associations.

3. Recognize study biases and understand methods for minimizing bias

4. Identify some of the major chemical, physical, and biological agents as risk factors for environmentally-related diseases.

5. Describe hazardous effects of some major environmental exposures on human physical health, including disease induction, physiological impairment, and genetic susceptibility to risk.

6. Describe methods for assessing human exposures to hazardous agents for epidemiologic research purposes.

7. Describe pathways of exposure to hazardous agents in the workplace and general environment.

8. Describe the influences of genetic susceptibility on risks related to environmental agents.

9. Write a term paper on a selected topic concerning adverse health related to workplace or general environmental hazardous agents; the assignment involves review of relevant literature and development of a research protocol similar to a condensed version of an NIH grant application.

10. Describe risk assessment methods that are used by governmental agencies to set exposure guidelines and standards.

Course requirements:

(40%) Take-home exam. Handed out Thursday **May 2**, due Tuesday **May 9**.

(50%) One term paper that includes a review of the literature on a relevant topic and a proposed research design. Topics must be approved in advance; due Thursday, **May 21**.

(10%) Classroom participation.

Required readings (available through the course web site, Health Sciences Library electronic reserves, or publishers' web sites):

- Selected journal articles and book chapters, as listed in the schedule. The course web site will include a link to the on-line, electronic version of each assigned article.

Suggested supplementary text (not required):

- Rosenstock L, Cullen MR, Brodkin CA, Redlich CA (eds). *Textbook of Clinical Occupational and Environmental Medicine* 2nd Ed. Philadelphia: WB Saunders, 2005.

Schedule – lectures and assignments:

April 2 – Overview of research designs and biases in occupational epidemiology [Harvey Checkoway]

Readings:

- Checkoway H, Pearce N, Kriebel D. Selecting appropriate study designs to address specific research questions in occupational epidemiology. *Occup Environ Med* 2007;64:633-8.

- Pearce N, Checkoway H, Kriebel D. Bias in occupational epidemiology studies. *Occup Environ Med* 2007;64:562-568.

April 4 – Overview of research designs and biases in environmental epidemiology [Harvey Checkoway]

Readings:

- Morgenstern H, Thomas D. Principles of study design in environmental epidemiology. *Environ Health Perspect* 1993;101(Suppl 4):23-38.
- Merrill RM. *Environmental Epidemiology: Principles and Methods*. Sudbury, MA: Jones & Bartlett Publishers, 2008, pp 3-25.

April 9 - Exposure assessment approaches [Harvey Checkoway]

Readings:

- Nieuwenhuijsen MJ. Introduction to exposure assessment (Ch 1). In: Nieuwenhuijsen MJ (ed.) *Exposure assessment in occupational and environmental epidemiology*. New York: Oxford University Press, 2003, pp 3-20.
- Friessen MC, Davies HW, Teschke K, et al. Impact of the specificity of the exposure metric on exposure-response relationships. *Occup Environ Med* 2007;18:88-94.

April 11 – Air Pollution health effects [Harvey Checkoway]

Readings:

- Miller KA, Siscovick DS, Sheppard L, et al. Long-term exposure to air pollution and incidence of cardiovascular events in women. *N Engl J Med* 2007;356:447-58.

- Gauderman WJ, Vora H, McConnell R, et al. Effect of exposure to traffic on lung development from 10 to 18 years of age: a cohort study. *Lancet* 2007;369:571-7.

- Van Hee VC, Adar SD, Szpiro AA, et al. Exposure to traffic and left ventricular mass and function: the Multi-Ethnic Study of Atherosclerosis. *Am J Respir Crit Care Med* 2009;179:827-34.

April 16 – Climate change **[Harvey Checkoway]**

Readings:

- Vanhems P, Gambiotti L, Fabry J. Excess rate of in-hospital death in Lyons, France, during the August 2003 heat wave. *N Engl J Med* 2003;2077-8.
- McMichael AJ, Woodruff RE, Hales S. Climate change and human health: present and future risks. *Lancet* 2006;367:859-69.

April 18 – Water pollution **[Susan Searles Nielsen]**

Readings:

- Gallagher LG, Webster TF, Aschengrau A, Vieira VM. Using residential history and groundwater modeling to examine drinking water exposure and breast cancer. *Environ Health Perspect* 2010;118:749-55.
- Villanueva CM, Kantor KP, Grimalt JO, et al. Bladder cancer and exposure to water disinfection by-products through ingestion, bathing, showering, and swimming in pools. *Am J Epidemiol* 2007;165:148-56.
- Vinceti M, Bonvicini F, Rothman KJ, Vescovi L, Wang F. The relation between amyotrophic lateral sclerosis and inorganic selenium in drinking water: a population-based case-control study. *Environ Health* 2010;9:77-85.

April 23 – Nanoparticles **[Ling Cui]**

Readings:

- Methner M, Beaucham C, Crawford C et al. Field application of the nanoparticle emission assessment technique (NEAT): task-based air monitoring during the processing of ngineered nanomaterials (ENM) at four facilities. *J Occup Environ Hyg* 2012;9:543-55.
- Bakand S, Hayes A, Dechsakulthorn F. Nanoparticles: a review of particle toxicology following
- inhalation exposure. *Inhal Toxicol* 2012;24:125-35.
- Oberdorster G. Safety assessment for nanotechnology and nanomedicine: concepts of nanotoxicology. *J Intern Med* 2010;267:89-105.

April 25 – Ionizing radiation [Scott Davis]

Readings:

- Boice JD. Chapter 15: Ionizing Radiation. In Schottenfeld D, Fraumeni JF Jr (eds). Cancer Epidemiology and Prevention. Third Edition. Oxford University Press, New York, New York, 2006.

- Davis S, Stepanenko V, Rivkind N, et al. Risk of thyroid cancer in the Bryansk Oblast of the Russian Federation after the Chernobyl Power Station accident. *Rad Res* 2004;162:241-248.

- Kopecky KJ, Stepanenko V, Rivkind N, et al. Childhood Thyroid Cancer, Radiation Dose from Chernobyl, and Dose Uncertainties in Bryansk Oblast, Russia: A Population-Based Case-Control Study. *Rad Res* 2006;166:367-374.

- Cardis E, Howe G, Ron E, et al. Cancer consequences of the Chernobyl accident: 20 years on. *J Radiol Prot* 2006;26:127-140.

April 30 – Occupational and environmental respiratory disease [Harvey Checkoway]

Readings:

- Schenker MB, Stoecklin M, Lee K, et al. Pulmonary function and exercise-associated changes with chronic low-level paraquat exposure. *Am J Respir Crit Care Med* 2004;170:773-9.

- Van Rooy FGBGJ, Smit LAM, Houba R, et al. A cross-sectional study of lung function and respiratory symptoms among chemical workers producing diacetyl for food flavourings. *Occup Environ Med* 2009;66:105-10.

- Antó JM, Sunyer J, Rodriguez-Roisin R, et al. Community outbreaks of asthma associated with inhalation of soybean dust. Toxicoepidemiological Committee. *N Engl J Med* 1989;320:1097-102.

May 2 – Occupational and environmental cancer [Harvey Checkoway]
****MIDTERM HANDED OUT**

Readings:

- Beane Freeman L, Blair A, Lubin JH. Mortality from lymphohematopoietic malignancies among workers in formaldehyde industries. *J Natl Cancer Inst* 2009;101:751-61.

- Silverman DT, Samanic CM, Lubin JH, et al. The diesel exhaust in miners study: a nested case-control study of lung cancer and diesel exhaust. *J Natl Cancer Inst* 2012;104:1-14.

- Miligi L, Constantini AS, Benvenuti A, et al. Occupational exposure to solvents and the risk of lymphomas. *Epidemiology* 2006;17:552-61.

- Consonni D, Pesatori AC, Zochetti C, et al. Mortality in a population exposed to dioxin after the Seveso, Italy accident in 1976: 25 years of follow-up. *Am J Epidemiol* 2008;167:847-58.

May 7 - Circadian rhythm disruption and cancer [Parveen Bhatti]

Readings:

- Costa G, Haus E, Stevens R. Shift work and cancer – considerations on rationale, mechanisms, and epidemiology. *Scand J Work Environ Health* 2010;36:163-79.

- Micirk DK, Davis S. Melatonin as a biomarker of circadian dysregulation. *Cancer Epidemiol Biomark Prev* 2008;17:3306-13.

- Bhatti P. Cushing-Haugen KL, Wicklund KG, et al. Nightshift work and risk of ovarian cancer. *Occup Environ Med* 2013;70:231-7.

May 9 – Adverse reproductive outcomes [Harvey Checkoway]
****MIDTERM DUE**

Readings:

- Settimi L, Spinelli A, Lauria L, et al. Spontaneous abortion and maternal work in greenhouses. *Am J Ind Med* 2008;51:290-5.

- Eskenazi B, Marks AR, Catalano R, et al. Low birthweight in New York City and upstate New York following the events of September 11th. *Hum Reprod* 2007;22:3013-20.

- Meeker JD, Rossano MG, Protas B, et al. Cadmium, lead, and other metals in relation to semen quality: human evidence for molybdenum as a male reproductive toxicant. *Environ Health Perspect* 2008;116:1473-9.

May 14 – Children's environmental health [Catherine Karr]

Readings:

- Morgan WJ, Crain EF, Gruchalla RS, et al. Results of a home-based environmental intervention among urban children with asthma. *N Engl J Med* 2004;351:1068-80.

- Bouchard MF, Chevrier J, Harley KG, et al. Prenatal exposure to organophosphate pesticides and IQ in 7-year-old children. *Environ Health Perspect* 2011;1189-95.

- Grandjean P, Andersen EW, Budtz-Jorgensen E, et al. Serum vaccine antibody concentrations in children exposed to perfluorinated compounds. *JAMA* 2012;307:391-7.

May 16 – Environmental endocrine disruptor chemicals [Sheela Sathyanarayana]

Readings:

- Gore AC. Endocrine disrupting chemicals: from basic research to clinical practice. In: Conn PM (ed.). *Contemporary Endocrinology*, Totowa, NJ: Human Press; 2007:pp 3-8.
- Sathyanarayana S. Phthalates and children's health. *Curr Prob Pediatr Adolesc Health* Care. 2008;121:260-8.
- Hoover RN, Hyer M, Pfeiffer RM, et al. Adverse health outcomes in women exposed in utero to diethylstilbesterol. *N Engl J Med* 2011:365:1304-14.

May 21 – Review of midterm exam
****TERM PAPER DUE**

May 23 – Neurodegenerative diseases [Harvey Checkoway]

Readings:

- Davanipour Z, Tseng C-C, Lee P-J, Sobel E. A case-control study of occupational magnetic field exposure and Alzheimer's disease: results from the California Alzheimer's Disease Diagnosis and Treatment Centers. *BMC Neurol* 2007;7:13-22.
- Kamel F, Tanner CM, Umbach DM, et al. Pesticide exposure and self-reported Parkinson's disease in the Agricultural Health Study. *Am J Epidemiol* 2007;165:364-74
- Cox PA, Sacks OW. Cycad neurotoxins, consumption of flying foxes, and ALS-PDC disease in Guam. *Neurology* 2002;58:956-59.

May 28 – Gene/environment interactions [Susan Searles Nielsen]

Readings:

- Checkoway H, Bhatti P, De Roos AJ. Epidemiologic approaches. IN: Costa LG, Eaton DL (eds.) *Fundamentals of Ecogenetics*. John Wiley & Sons, Hoboken, NJ, 2006; pp51-71.
- Cantor K, Villanueva CM, Silverman DT, et al. Polymorphisms in GSTT1, GSTZ1, and CYP2E1, Disinfection Byproducts, and Risk of Bladder Cancer in Spain. *Environ Health Perspect* 2010;118:1545-50.
- Wenten M, Gauderman WJ, Berhane K, Lin PC, Peters J, Gilliland FD. Functional variants in the catalase and myeloperoxidase genes, ambient air pollution, and respiratory-related school absences: an example of epistasis in gene-environment interactions. *Am J Epidemiol* 2009;170:1494-1501.

May 30 – Special applications of occupational/environmental epidemiology [Harvey Checkoway]

Readings:

- Lenters V, Basinas T, Beane Freeman L, et al. Endotoxin exposure and lung cancer risk: a systematic review and meta-analysis of the published literature on agriculture and cotton textile workers. *Cancer Causes & Control* 2010;21:523-55.

- Park R, Rice F, Stayner L, et al. Exposure to crystalline silica, silicosis, and lung disease other than cancer in diatomaceous earth industry workers: a quantitative risk assessment. *Occup Environ Med* 2002;59:36-43.

- Hill AB. The environment and disease: association or causation? *Proc Roy Soc Med* 1965;58:295-300.

June 4 – Development of occupational epidemiology research program: Shanghai women textile workers [Harvey Checkoway]

Readings:

- Astrakianakis G, Seixas NS, Ray R, Camp JE, Gao DL, Feng Z, Wernli K, Fitzgibbons ED, Thomas DB, Checkoway H. Reduced risk of lung cancer among female textile workers exposed to endotoxin. *J Natl Cancer Inst* 2007;99:357-64.

- Cui L, Gallagher LG, Ray RM, Li W, Gao DL, Zhang Y, Vedal S, Thomas DB, Checkoway H. Unexpected excess chronic obstructive pulmonary disease mortality among female silk textile workers in Shanghai, China. *Occup Environ Med* 2011;68:883-7.

- Gallagher LG, Ray RM, Li W, Psaty BM, Gao DL, Thomas DB, Checkoway H. Occupational exposures and mortality from cardiovascular disease among women textile workers in Shanghai, China. *Am J Ind Med* 2012;55:991-9.