
BIOGRAPHICAL SKETCH

NAME: **Brenda Eskenazi**

eRA COMMONS USER NAME (credential, e.g., agency login): **Beskenazi**

POSITION TITLE: **Professor**

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	Completion Date MM/YYYY	FIELD OF STUDY
Queens College, City University of New York	BA	1971	Psychology
Queens College, City University of New York	MA	1974	Psychology
Graduate School and University Center, City University of New York	PhD	1979	Neuropsychology
Yale University, School of Public Health	Post-Doc	1981	Epidemiology/ Toxicology

A. Personal Statement

I have conducted research over the last 30 years on the effects of social, nutritional, and environmental agents on male and female reproduction and on child development from fetal to adolescence. As an environmental epidemiologist, most of my research has centered on the effects of environmental toxicants including manganese, lead, arsenic, indoor air pollution, solvents, environmental tobacco smoke, dioxin, and pesticides on child neurodevelopment. As a neuropsychologist, I am particularly interested in the interaction of social adversity and environmental exposures in humans and how it affects child development. With over 30 years of research and instruction MCH Epidemiology, I was awarded the Maxwell Endowed Professorship of Maternal and Child Health and Epidemiology at the University of California, Berkeley. I am chair of the Division of Community Health which represents half of the faculty of the School of Public Health. I have been the Principal Investigator and Director for the last 17 years of the NIH/EPA Center for Excellence in Children's Environmental Health Research (the keystone study is the "CHAMACOS" Project) which investigates the pathways and health effects of pesticide and other environmental exposures in farmworkers and their children and develops interventions to prevent future exposure. I am currently the Principal Investigator on other NIEHS-funded projects, including one based in Seveso, Italy investigating the children of women exposed to high levels of dioxin, and another examining the effects of pesticides DDT and pyrethroids, which are used for malarial control, on child development in South Africa. I am now part of a larger consortium headed by Dr. Jack Shonkoff at Harvard to examine early life adversity in children and develop potential interventions. For the current proposal on phthalates and neurodevelopment, I will provide critical guidance to the PI (Dr. Sagiv) and will assist in the analysis, interpretation and manuscript writing for all aims based on my expertise on the effects of environmental toxicants on human brain development and behavior, longitudinal birth cohort studies and neurodevelopmental assessment.

B. Positions and Recent Honors

License 1982 Psychology

Professional Experience

1983-1984 Assistant Professor in Environmental Health, Yale School of Medicine
1984-1986 Assistant Professor in Maternal and Child Health and Epidemiology, SPH, UC Berkeley
1986-1989 Acting Asst. Professor in Maternal and Child Health /Epidemiology, SPH, UC Berkeley
1989-1995 Associate Professor in Maternal and Child Health and Epidemiology, SPH, UC Berkeley
1997-2000 Chair, Maternal and Child Health, SPH, UC Berkeley
1994-present Member, Graduate Group in Environmental Health Sciences, SPH, UC Berkeley
1995-present Professor in Maternal and Child Health, and in Epidemiology, SPH, UC Berkeley

1998-present Director, Center for Environmental Research and Children's Health, UC Berkeley
2012-present Chair, Division of Community Health and Human Development, UC Berkeley

Honors

1995 Fogarty Senior International Fellowship
1996 Fellow, American College of Epidemiology
2008 Jennifer and Brian Maxwell Endowed Chair
2012 John R. Goldsmith Award, International Society for Environmental Epidemiology, Lifetime Achievement
2014 Inducted into Collegium Ramazzini for top 150 people in the world in Occupational and Environmental Health.

Other Experience and Professional Memberships

2002-2006 Children's Health Co-Editor, *Environmental Health Perspective*
2002-2007 Member, Child, Youth and Families Board, NAS, Institute of Medicine
1999-2014 Associate Editor, *American Journal of Epidemiology*
2006-present Editorial Board, *Environmental Health Perspectives*
2013-present Editorial Board, *Environmental Research*
2009-present Founding member and Councilor, International Society for Children's Health and the Environment
2012-2015 Councilor, International Society of Environmental Epidemiology

C. Contributions to Science

1. **Male reproduction:** One theme of my research has been the relationship of paternal characteristics on genetic and non-genetic markers in sperm, on male fertility, and on the birth outcomes of their children. We have examined the effects of nutritional factors, age, and exposures to various environmental chemicals such as benzene. We have also compared the relationship with genetic changes in sperm and in blood. Our work on the effects of paternal age was one of the first studies that suggested there were decreases in fertility with age in men and an increase in certain genetic markers, which could result in increased abnormalities in their offspring.
 - a. Wyrobek AJ, Eskenazi B, Young S, Arnheim N, Tiemann-Boege I, Jabs EW, Glaser RL, Pearson FS, Evenson D. Advancing age has differential effects on DNA damage, chromatin integrity, gene mutations, and aneuploidies in sperm. *Proc Natl Acad Sci*, 103(25):9601-6, 2006. PMID: PMC1480453
 - b. Young S, **Eskenazi B**, Marchetti F, Block G, Wyrobek AJ. The association of folate, zinc, and antioxidant intake with sperm aneuploidy in healthy non-smoking men. *Human Reproduction*, 19; 23:1014-22, 2008.
 - c. Xing C, Marchetti F, Li G, Weldon RH*, Kurtovich E, Young S, Schmid te*, Zhang L, Rappaport S, Waityanatha S, Wyrobek AJ, **Eskenazi, B**. Benzene exposure near the U.S. permissible limit is associated with sperm aneuploidy. *Environmental Health Perspectives*, 118(6):833-839, 2010. PMID: PMC2898861
 - d. Ji Z, Weldon RH, Marchetti F, Chen H, Li G, Xing C, Kurtovich E, Young S, Schmid TE, Waidyanatha S, Rappaport S, Zhang L, **Eskenazi B**. Comparison of aneuploidies of chromosomes 21, X, and Y in the blood lymphocytes and sperm cells of workers exposed to benzene. *Environmental and Molecular Mutagenesis*, 53(3): 218-26, 2012.
2. **Women's health and reproduction:** Another theme of my research examines women's health, primarily reproductive health. We have investigated risk factors of preeclampsia, gestational diabetes, infertility, endometriosis, and fibroids. We have studied the consequences of some of these maternal health outcomes on their children's health and we have examined how exposure to certain environmental agents, including the endocrine disruptor dioxin, may play an etiologic role in adverse reproductive health outcomes, such as in industrialized populations who may have greater exposures.
 - a. Marino JL, **Eskenazi B**, Warner M, Samuels S, Vercellini P, Gavoni N, Olive D. Uterine leiomyoma and menstrual cycle characteristics in a population-based cohort study. *Human Reproduction*, 19(10):2350-5, 2004
 - b. **Eskenazi B**, Warner M, Marks AR, Samuels S, Needham L, Brambilla P, Mocarelli P. Serum dioxin concentrations and time to pregnancy. *Epidemiology*, 21:224-31, 2010

- c. Warner M, Mocarelli P, Samuels S, Needham L, Brambilla P, **Eskenazi B**. Dioxin exposure and cancer risk in the SEVESO Women's Health Study. *Environmental Health Perspectives*, 119: 1700-1705, 2011. PMID: PMC3261987
 - d. Ehrlich SF, Rosas LG, Ferrara A, King JC, Abrams B, Harley KG, Hedderson MM, **Eskenazi B**. Pregnancy glycemia in mexican-american women without diabetes or gestational diabetes and programming for childhood obesity. *American Journal of Epidemiology*, 177:768-775, 2013. PMID: PMC3668427
3. **Effects of social stress:** I have also investigated the effects of exposure to stress on the developing fetus. I have studied the general effects of occupational and social stress as well as the effects of various environmental disasters or perceived disasters including Three Mile Island and the aftermath of 9/11.
- a. Kasl SV, Chisholm RF, **Eskenazi B**. The impact of the accident at the Three Mile Island on the behavior and well-being of nuclear workers. Part I: Perceptions and evaluations; Behavioral response and work-related attitudes and feelings. *American Journal of Public Health*, 71:472-83, 1981 PMID: PMC1619731
 - b. Catalano R, Bruckner T, Gould J, **Eskenazi B**, Anderson E. Sex ratios in California following the terrorist attacks of September 11, 2001. *Human Reproduction*, 20(5):1221-7, 2005.
 - c. Obel C, Brink Henriksen T, Jorgen Secher N, **Eskenazi B**, Hedegaard, M. Psychological distress during early gestation and offspring sex ratio. *Human Reproduction*, 22(11):3009-12, 2007.
 - d. **Eskenazi B**, Marks AR, Catalano R, Bruckner T, Toniolo PG. Low birthweight in New York City and Upstate New York following the events of September 11th. *Human Reproduction*, 22(11):3013-20, 2007.
4. **Children's environmental health:** I am perhaps best known for the study of various chemicals on child neurodevelopment and other health endpoints in children. This research has included the study of caffeine, smoking, solvents, organophosphate pesticides, organochlorine pesticides, fungicides, fumigants, dioxins, flame retardants and numerous others. I have also studied gene environment interaction and more recently the effects of exposure to environmental chemicals on the epigenome of the developing child. My research has had an important impact on the regulation of these chemicals at the State and Federal level, on warnings posted under Proposition 65 in California, on international documents informing the Stockholm convention, and on consultations to scientists and regulators around the world.
- a. Wesselink A, Warner M, Samuels S, Parigi A, Brambilla P, Mocarelli P, **Eskenazi B**. Maternal dioxin exposure and pregnancy outcomes over 30 years of follow-up in Seveso. *Environ Int*, 63:143-8, 2014. PMID: PMC3891592
 - b. **Eskenazi B**, Kogut K, Huen K, Harley KG, Bouchard M, Bradman A, Boyd-Barr D, Johnson C, Holland N. Organophosphate pesticide exposure, PON1, and neurodevelopment in school-age children from the CHAMACOS study. *Environ Res*, 134:149-57, 2014. PMID: PMC4338203
 - c. Raanan R, Harley K, Balmes J, Bradman A, Lipsett M, **Eskenazi B**. Early-life Exposure to organophosphate pesticides and pediatric respiratory symptoms in the CHAMACOS cohort. *Environmental Health Perspectives*, 123:179-85, 2015 PMID: PMC 4314248
 - d. Erkin-Cakmak A, Harley K, Chevrier J, Bradman A, Kogut K, Huen K, **Eskenazi B**. In Utero and Childhood Polybrominated Diphenyl Ether Exposures and Obesity in the CHAMACOS Study. *Environmental Health Perspectives*, Feb 27, 2015. [Epub ahead of print]

Complete List of Published Work in MyBibliography:

<http://www.ncbi.nlm.nih.gov/sites/myncbi/brenda.eskenazi.1/bibliography/40713269/public/?sort=date&direction=ascending>

D. Research Support
ESKENAZI, B

ACTIVE

2P01ES009605-11 / RD-83451301 (Eskenazi) 8/1/2009- 7/31/2016 NCE

NIH NIEHS / EPA \$487,198/ \$480,298

Children's Center for Environmental Health Research

The major goal of this project is to assess the correlation between pesticide exposure and the health of farmworker children in California. We propose to examine the exposure, health effects, and epigenetic effects of exposure to Mn, PBDE, DDT in the CHAMACOS Cohort boys ages 9-13 years old.

1R01 ES017054-01A1 (Eskenazi) NIH NIEHS	8/01/2009-4/30/2016 \$421,733	NCE
DDT & PBDE exposure, puberty onset and neurodevelopment in Mexican-American girls The goal of this research is to examine the relationship of DDT/E and PBDE exposure with neurobehavioral functioning and with pubertal development in CHAMACOS birth cohort girls, as well as some new enrollees, who were also born and raised in Salinas Valley, Ca, at age 9-12.		
R01 ES020360-01 (Eskenazi) NIEHS	8/25/2011-04/30/2016 \$516,866	1 Summer Mo.
IRS insecticides for malaria control and child development in South Africa This study aims to evaluate the effects of prenatal exposure to dichlorodiphenyl trichloroethane (DDT), its breakdown product dichlorodiphenyl dichloroethylene (DDE), and the pyrethroid insecticides deltamethrin and cypermethrin on child neurobehavioral development in the Limpopo province of South Africa where the chemicals are used for Indore Residual Spraying (IRS) of homes for malaria control purposes.		
2R01ES007171-15 (Eskenazi) NIEHS	08/16/2013-04/30/2018 \$435,286	1 Summer Mo. 1 Academic Mo.
In utero dioxin exposure in Seveso, Italy and health of the second generation This project focuses on a comprehensive examination of the health of children of women exposed to large amount of dioxin in Seveso, Italy during and explosion in 1976. The study is the only comprehensive study to date of health effects of dioxin exposure in a female population, and has the unique benefit of measurements of individual-level TCDD in blood collected near the time of the explosion.		
1R01ES021369-01A1 (Holland) NIEHS	07/01/2013-02/28/2018 \$430,314	0.50 summer mo.
Molecular mechanisms of obesity in children exposed to phthalates <i>in utero</i> The proposed interdisciplinary study will make use of the extensive collection of biological samples and data gathered on children from early gestation through puberty. Specifically, we will examine the potential role of prenatal phthalate exposure on: obesity and metabolic syndrome development, biomarkers and obesity (adiponectin and leptin), oxidative stress (isoprostanes), and epigenetic changes characterized by DNA methylation.		
1R01DA035300-01 (Deardorff) NIEHS	12/01/2013-11/30/2018 \$550,038	0.50 summer mo.
Early adversity shapes adolescent risk behavior trajectories in Mexican-Americans By building on a rich, well-established, long-term cohort of Mexican American children and their families, this project aims to understand how adversity exposure in early life contributes to the emergence of substance use and HIV risk behaviors during adolescence.		
1R01ES023067-01 (Holland) NIEHS	07/01/2013-06/30/2017 \$250,000	0.50 Summer Mo.
PON Epigenetics and Neurodevelopment in Children This proposed interdisciplinary study takes advantage of an extensive collection of biological samples and neurobehavioral data on our CHAMACOS study children and provides a unique opportunity to address knowledge gaps on the molecular mechanisms affecting susceptibility to impaired cognition in a well characterized minority birth cohort.		
1R01ES021799-01A1 (A.Smith) NIEHS	12/01/2013-11/30/2017 \$516,631	0.50 summer mo.
Cohort follow-up study of children exposed to arsenic in utero and early childhood This is a continuation of our previous Bangladesh study on the effects of early life arsenic exposure on lung health. We will follow these children for three more years and study important new health outcomes, including early biomarkers of cardiovascular disease, renal disease and diabetes.		

21BB-1900 (Harley) 8/01/2015-07/31/2017 0.35 Summer Mo.

California Breast Cancer Research Program \$240,549

Peer-to-Peer reduction of pesticide exposure to Latina youth

This project aims to characterize levels of pesticide exposure in 100 adolescent Latina girls in an agricultural community. We will teach participants and other community members how agricultural pesticide use influences personal exposures using pesticide use reporting data maps. The study will also empower CHAMACOS Youth Community Council (YCC) members by teaching them environmental health research methodologies and health education and advocacy skills.

JPB (Private Foundation) Shonkoff (PI) 02/01/2016-01/31/2018 0.50 Summer Mo.

Harvard Center on the Developing Child at Harvard University (Subaward)

Study the role of early life social adversity of children in relation to epigenetic changes. CHAMACOS is one of the studies that will be working in the consortium with a team of experts to define the most relevant social adversity in examination of epigenetic changes in cord and child blood.

2 T76MC00002-60-00 (C. Pies) 09/2015 – 05/2016 0.45 Academic Mo.

Health Resources and Services Administration \$520,000

MCH Training Grant

This federal grant supports postdoctoral positions in maternal and child epidemiology Maternal and Child Health division of the School of Public Health. Eskenazi is the director of the postdoctoral fellowship program.

PENDING

R01 (Eskenazi) 9/1/2016- 8/30/2021 1 Summer Mo.

NIH NIEHS \$600,000

Children's Center for Environmental Health Research

The major goal of this project is to assess the correlation between pesticide exposure and the health of farmworker children in California. We propose to examine the exposure, health effects, and epigenetic effects of exposure to Mn, PBDE, DDT in the CHAMACOS Cohort boys.

OVERLAP

As new projects are funded, Dr. Eskenazi will adjust her time accordingly so that her total effort does not exceed 100%.

Completed Research Support

1RC2ES018792-02 (NIH NIEHS) \$1, 493,880/5 years Harley, Eskenazi (PIs) 09/30/2009-07/31/2012

Bisphenol A and Children's Growth & Development

This proposal seeks to examine cognitive functioning, thyroid hormone levels, metabolic syndrome and BPA exposure in the CHAMACOS birth cohort.

Role: Co-PI

R01 ES015572-03 (NIH NIEHS) \$2,048,592/ 5 years Eskenazi (PI) 08/07/2007-04/30/2012

PBDEs, DDT and Neurodevelopment in School-Aged Mexican-American Children

Role: PI

R01 ES07171-10 (NIH NIEHS) \$2,211,980/5 years Eskenazi (PI) 09/26/2007-06/30/2012

Female Reproductive Outcomes and TCDD Exposure in Seveso

This project studies the relation of serum TCDD to breast cancer, diabetes, and metabolic syndrome.

Role: PI

RD-83511001 (EPA) Eskenazi (PI) 10/01/2011- 9/30/2012

Building Capacity to Reduce Children's Environmental Exposures in Child-Occupied Settings

Role: PI

1R01 ES012503 (NIH) \$1,748,016/5 years Holland (PI) 01/01/2006-12/31/2010

PON1 and Developmental Sensitivity to OP Pesticides

The major goals of this project are to create a PON1 gene haplotype map, examine the ontogeny of PON1 enzyme activity in infants, evaluate whether PON1 genotype is associated with OP pesticides in maternal and cord blood, and determine whether PON1 modifies the relationship of OP exposure and fetal development.

RD-83273401 (EPA) \$749,987

Eskenazi (PI)

03/20/2006-02/28/2011

EPA

PON1 as a Predictor of Differential Susceptibility of Children to Organophosphate

This project evaluates whether PON1 genotype/activity in populations exposed to pesticides is an early indicator of environmentally-induced disease.

R01 HL081520 \$2,252,688/5 years

Smith(PI)

05/01/2007-04/30/2011

NIH

Arsenic and Child Respiratory Health in Bangladesh

This project examines the relationship of arsenic exposure to respiratory health in Bangladesh.

Environment Innovation Fund (Eskenazi)

01/2012-12/2013

Passport Foundation: Impact of pyrethroid pesticide exposures during pregnancy and early childhood on the neurodevelopment of school-age children.

The goal of this project is to evaluate the effects of pyrethroid exposure during the prenatal period and during childhood on child neurodevelopment in the CHAMACOS cohort and to evaluate the association between childhood pyrethroid exposure and attention deficit hyperactivity disorder on a subsample of children from the National Health and Nutrition Examination Survey (NHANES).

1R56ES023591-01 (Bradman)

9/17/14-09/16/15

0.15 summer mo.

NIEHS

\$321,959

Current-Use Fumigants: Health Effects of Prenatal and Early Childhood Exposures

To investigate the association of residential proximity to chloropicrin, 1,3-DCP, metam sodium and MeBr applications during pregnancy and early childhood with neurodevelopment (cognition and attention), lung function and immunologic biomarkers in CHAMACOS children at 7 years. This study will generate new information about the health effects of human exposure to high-use soil fumigants and inform current policy decisions.