Prenatal Environmental Exposures as a Determinant of Early Childhood and Adult Disease

McKinney Roughs Nature Park
and Education Center
Cedar Creek, Texas
November 13-14, 2014
Participants are invited to attend the reception on Thursday from 5:00-6:00 p.m. on the patio.

Retiring Board Members, Children’s Environmental Health Institute

Dr. Martin Lorin  
2001-2014

Best wishes for a well earned and deserved retirement for Dr. Marin Lorin from his career as Professor, Baylor College of Medicine and Attending Physician, Texas Children’s Hospital.

Dr. Donald Dudley  
2002-2014

Congratulations to Dr. Donald Dudley in his new position as the William P. Moore Professor and Director of Obstetrics & Gynecology, University of Virginia School of Medicine.

The Children’s Environmental Health Institute Board of Directors and staff are honored and grateful to have served with such charming, distinguished, visionary leaders and advocates.

You enrich the lives of your colleagues, students, friends, and most importantly our children.

Each of you will always be an extended family member and remain in the heart of the Children’s Environmental Health Institute.
As co-chairs of the 2014 Children’s Environmental Health Institute Symposium, we cordially welcome all of you—presenters, participants, sponsors and supporters—and very much appreciate your attending this symposium on an important topic that affects all of us.

This year our symposium focuses on the importance of prenatal environmental exposures as determinants of early childhood and adult disease. Approximately 1 in 6 American children now suffer from some form of neurological impairment, most of which have an unknown cause. We do know, however, that many ubiquitous chemicals in our environment, like lead, mercury, flame retardants, BPA, arsenic, PCBs, and pesticides, are linked with cognitive impairments and a host of other health problems that span the life course.

These chemicals are in our environment, they are in our bodies, and preconception and prenatal exposure to toxic environmental chemicals is ubiquitous. An alarming development is the compelling body of research that shows that the placenta, and later the blood-brain barrier, are providing inadequate filters for these chemicals, and our children are being born “pre-polluted.”

Crucially, many harmful environmental exposures disproportionately affect vulnerable populations, who are the least able to protect themselves and their families from these environmental hazards.

Because of deficiencies in the current regulatory structure most environmental chemicals have entered the marketplace without adequate information regarding their health effects. Preventing exposure before it happens is vital, and so legislation is necessary to shift the burden of proof from the individual and the consumer to the manufacturer before any chemicals enter the marketplace or the environment.

This is an issue that spans disciplines, professions, ages, and ethnicities. This is why we are so delighted to have with us for this symposium a wide range of interested individuals and outstanding speakers.

Donald Dudley, MD  
Steering Committee Co-Chair

Jules Reinhart Elkins, PhD  
Steering Committee Co-Chair

This symposium is about prenatal environmental exposures, but also advocacy and inspiration. We seek to bridge science and outreach, education and passion, and to bring together these diverse interests to seek new ways to address this important issue.

We hope that you find the symposium informative and thought provoking, and that you leave with an improved understanding of how preconception and prenatal exposure to toxic environmental agents can have a profound and lasting effect on health across the life course.

We would be remiss if we did not acknowledge the people and organizations that have made this year’s symposium possible. We want to thank Saint Susie Charitable Foundation, U.S. Environmental Protection Agency, Reliant Energy, Austin Energy, Saint David’s Foundation, Special Audience Marketing, Concordia University School of Nursing, and Teri Mason Photography without whose financial contributions and support the symposium would not be possible.

We would also like to thank the CEHI Board members and the Symposium Steering Committee for all their suggestions, contributions and help in planning and working on the symposium. Lastly, we would like to extend a special recognition to Janie Fields, Executive Director of CEHI, who has worked tirelessly and donated so much of her time and talent to make this symposium a success.
Welcome to our 8th Children’s Environmental Health Institute (CEHI) Symposium, special thanks to our sponsors, speakers, and to CEHI Executive Director, Janie Fields, Program Coordinator, Sarah Jones and their volunteers.

As I reflect on my combined career in Pediatrics and Public Health that spans over four decades, and the thousands of children and families that I have served directly or indirectly, perhaps you will allow me to stand in for you and some of our colleagues who have also been on the front lines in the care of children and their mothers and take considerable pride in what has been accomplished during this time.

As you well know, there has been a significant reduction in infant mortality; improved access to early prenatal care; reduction of prematurity; surgeon general’s warning for consumption of alcohol, and use of tobacco products, and limiting exposure to environmental smoke; prevention of congenital rubella, and protection against other vaccine preventable diseases, including, pertussis, influenza; also measures to prevent the transmission of HIV to the developing fetus; implementation of guidelines for weight gain during pregnancy; timing of deliveries to not earlier that 39 weeks (unless indications for the health of the mother and infant). These are some of the wonderful accomplishments that have had very good evidence-based outcomes that indicate optimal health of the mother and infant.

Now regarding our symposium and the subject matter of Prenatal Environmental Exposures for the presentations, and discussions, we are definitely seeing some advances in the science and the associated clinical evidence related to exposures to environmental toxins and whether they be intentional or unintentional, and what might be considered for preventing or at least minimizing the effects. It is incumbent in our thinking about this to also consider the precautionary principle, and the paradigm of environmental justice.

Though there is a wealth of information that has evolved in recent years, there is much that we do not yet know, and will be introduced to today and tomorrow. As we learn, and develop some of our own terms of reference and understanding of these harmful trajectories, we will be much better prepared to intervene earlier in exposure pathways to prevent or intervene to change some of the unfortunate and irreversible outcomes.

As we have seen some remarkable benefits on the clinical side of preconceptional, prenatal, intrapartum and post-partum care, I know that as we participate in opportunities such as this, we will also see future improvements in the adverse impacts of environmental toxin exposures.

Fernando A. Guerra, M.D., M.P.H., F.A.A.P.
Chairman, Board of Directors, Children’s Environmental Health Institute

Photo Credit: Bear Guerra
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Thank you to our partners for their commitment to preventing environmental health risks to children through their support

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Steering Committee Co-Chair  
William T. Moore Professor and Director  
Division of Maternal-Fetal Medicine  
Department of Obstetrics and Gynecology  
University of Virginia School of Medicine

**Jules Reinhart Elkins**, PhD  
Steering Committee Co-Chair  
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Bright Horizons Family Solutions

**Janie D. Fields**, MPA  
Executive Director  
Children’s Environmental Health Institute
House Rules

- Moderators will ensure sessions start and finish on time.

- Questions from the audience will be written on index cards provided at tables and collected by volunteers during presentations and panels. Following the conclusion of the presentation/panel the moderator(s) will direct the questions to the appropriate speaker. If there is not enough time to respond to all questions, the remaining questions and answers will be posted on the CEHI website.

- Please fill out the evaluation forms. We do read them and take them into consideration in our planning.

- Audible cell phones are discouraged in meeting rooms. Please mute phones.

- Photographing and videotaping speakers during presentations is discouraged. There will be opportunities outside of the presentations.

Thank you for your cooperation

Continuing Medical Education Credits

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education through the joint sponsorship of Texas Medical Association and Children’s Environmental Health Institute, Inc. The Texas Medical Association is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

The Texas Medical Association designates this live activity for a maximum of 9 AMA PRA Category 1 Credits™, including 1.25 ethics and/or professional responsibility credit. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The Texas Medical Association designates the following presentation in medical ethics and/or professional responsibility: Chemical Brain Drain: Metals, Science, and Prevention Failures. Philippe Grandjean, MD, DMSc, Adjunct Professor of Environmental Health, Department of Environmental Health, Harvard School of Public Health, Professor and Chair of Environmental Medicine, University of Southern Denmark, Odense, Denmark; Consultant in Toxicology, National Board of Health, Denmark (1.25 credits).

Disclosure

Policies and standards of the Texas Medical Association, the Accreditation Council for Continuing Medical Education, and the American Medical Association require that speakers and planners for continuing medical education activities disclose any relevant financial relationship they may have with commercial entities whose products, devices or services may be discussed in the content of the CME activity. The speakers and planners for this activity have no relevant financial relationships to disclose.
The Children’s Environmental Health Institute

The Children’s Environmental Health Institute was established in 1999 to address adverse health effects to children occurring as a consequence of their exposure to environmental toxic substances. The mission of CEHI is to support education initiatives to improve children’s health with an emphasis on their micro (immediate) environments.

The board and staff are committed to decreasing the prevalence and consequences of environmentally related childhood diseases, and establishing ways of distributing information to protect the health of children.

CEHI supports a broad range of educational programs to improve children’s health. Such initiatives, although not limited to, include: scientific symposia, town hall meetings, policy roundtable discussions, community leadership forums, public awareness campaigns, children's picnic and real food fair and photographic essay exhibits.

For more information about our work, volunteering or making a contribution, please go to www.cehi.org or contact Janie Fields, CEHI Executive Director at Janie.fields@cehi.org.

“Never forget that the numbers in your tables are human destinites, although the tears have been wiped away”

Irving J. Selikoff (1915-1992)
2013 Houston Roundtable Discussion Project

Following the 2012 Biennial Scientific Symposium: *How School Environments Affect the Health and Educational Performance of Students*, hosted at Dell Children’s Medical Center of Central Texas, CEHI and US EPA Region 6 convened the *Houston Roundtable Discussion on the Environment Related to Asthma and Respiratory Diseases in Pre-School and School-Age Children*. The Roundtable Discussion was as invitational assembly conducted on November 15, 2013, to address the need to improve the prevention and management of asthma and respiratory disease (cystic fibrosis, reactive airway disease and recurrent respiratory tract allergies) in pre-school and school-age children within the Greater Houston Area.

CEHI board member, Dr. Martin Lorin, chaired the Roundtable Discussion. The purpose of the Roundtable Discussion was to provoke critical thinking on ways to strengthen and expand current networks to improve the quality of health for pre-school and school-age children afflicted with asthma and other respiratory diseases living in the Greater Houston Area.

A web based private forum supported participants in their preparation for the Roundtable Discussion. Participants defined Essential Core Elements to serve as building blocks for designing effective and sustainable action plans for public/government (including school districts) and private/civic organizations.

The Executive Summary Report and Full Report are available for download on the Children’s Environmental Health Institute’s website at [www.cehi.org](http://www.cehi.org)
AGENDA AT A GLANCE - Thursday

8:00  Registration and Continental Breakfast

9:00  Welcome: Donald Dudley, MD
     Symposium Program Co-Chair, CEHI Board Member

9:15  Keynote Address for the Day: Reproductive Health and the Environment: Well Woman Care and Preconception Health on the National Agenda
     Jeanne Conry, MD, PhD, University of California Davis Health System

10:15 Audience Discussion

10:30  BREAK

10:45  PANEL: Pediatric Environmental Health Specialty Units of the US Environmental Protection Agency and Agency for Toxic Substances and Disease Registry
     Moderators:
     Martha Berger, U.S. Environmental Protection Agency
     Michael Hatcher, Dr.PH, Agency for Toxic Substances and Disease Registry
     Panelists:
     Susan Buchanan, MD, MPH, Director of the Great Lakes Center for Children’s Environmental Health, Chicago, Illinois
     Jennifer Lowry, MD, Director of the Pediatric Environmental Health Specialty Unit, Kansas City, Missouri
     Jerome Paulson, MD, FAAP, Director of the Mid-Atlantic Center for Children’s Health and Environment, Washington, DC

12:15 Audience Discussion

12:30  LUNCH

1:30  PANEL: The Amazing Placenta
     Moderators:
     Martin Lorin, MD, Baylor College of Medicine, CEHI Board Member
     Vincent Torres, MSE, PE, MAC, The University of Texas at Austin, CEHI Board Member
     Panelists:
     Laura Anderko, PhD, RN, Georgetown University
     Donald Dudley, MD, University of Virginia School of Medicine
     Leslie Myatt, PhD, University of Texas Health Science Center

3:00  Audience Discussion

3:15  BREAK

3:30  Documentary Film Unacceptable Levels

4:45  Closing

5:00 – 6:00  Reception
AGENDA AT A GLANCE - Friday

8:00  Continental Breakfast

9:00  Welcome: Jules Elkins, PhD
      Symposium Program Co-Chair, CEHI Board Member

9:15  Keynote Address for the Day:
      Chemical Brain Drain: Metals, Science, and Prevention Failures
      Philippe Grandjean, MD, DMSc
      Harvard School of Public Health, University of Southern Denmark

10:15 Audience Discussion

10:30  BREAK

10:45  An Environment for Life: Engaging Faith Communities on Issues of Prenatal Environmental Exposures
      Rev. Fletcher Harper
      GreenFaith

11:45 Audience Discussion

12:00  LUNCH
      Lunch Speaker: Genetic, Environmental, and Nutritional Factors That Can Alter Human Development In Utero And Beyond
      Meredith Oltmann, PhD
      College of Science, Concordia University

1:00  Audience Discussion

1:15  BREAK

1:30  PANEL: Building For The Future:
      Building Materials and Human Health
      Moderators:
      Jules Elkins, PhD
      University of Texas, CEHI Board Member
      Mike Wells, AIA, NCARB
      Bright Horizons Family Solutions, CEHI Board Member
      Panelists:
      Roy Gunsolus, AIA, ACHA, LEED AP
      BD+C, HKS Architects
      Claudia S. Miller, MD, MS
      Harvard School of Public Health, University of Texas School of Medicine
      Roger B. Perales, MPH, RS, CIEC
      University of Texas Health Science Center

3:00  Audience Discussion

3:15  Symposium Summary Remarks
      Dr. Fernando Guerra, MD, MPH, FAAP
      CEHI Board Chair

3:30  Optional Discussion
      Groups/Networking
      • Medical Professionals
      • Built Industry
      • Faith Community/Outreach

4:00  Adjourn
Reducing exposure to toxic environmental agents is a critical area of intervention for obstetricians, gynecologists and other reproductive health professionals because health care providers are uniquely poised to intervene during preconception and pregnancy, a critical window of human development. Every pregnant woman in America is exposed to many different chemicals in the environment. And, prenatal exposure to certain chemicals is linked to miscarriages, stillbirths, and birth defects. We lack safety data on most of these chemicals even though they are everywhere—in the air, water, soil, our food supply, and everyday products.

Many chemicals that pregnant women absorb or ingest from the environment can cross the placenta to the fetus. Exposure to mercury during pregnancy, for instance, is known to affect cognitive development in children.

Environmental impacts can disproportionately affect vulnerable and underserved populations and are subsumed in issues of environmental justice. For example, in the United States, minority populations are likely to live in the counties with the highest levels of outdoor air pollution and immigrants have higher exposures to chemicals used on the crops that they harvest. Legal exposure limits for most workplace chemicals are not designed to protect against harm to a pregnancy or the developing fetus and risks that are considered acceptable for workers are much greater than risk levels established for the public.

Ultimately, evidence-based recommendations for preventing harmful environmental exposure must involve policy change. Although action at the individual level can reduce exposure to some toxic chemicals and informed consumer-purchasing patterns can send a signal to the marketplace to help drive societal change individuals alone can do little about exposure to harmful environmental toxic agents, such as from air and water pollution, and those perpetrated by poverty.

Environmental chemicals can act like medications on endocrine pathways. In the same way that physicians monitor the effect of medicines on endocrine pathways, we must achieve the same understanding and control of the effects of environmental chemicals.

To successfully study the impact of these chemical exposures, we must shift the burden of proof from the individual health care provider and the consumer to the manufacturers before any chemicals are released into the environment. Lawmakers must require that research define and estimate the dangers that aggregate exposure to harmful chemicals pose to pregnant women, infants, and children and act to protect these vulnerable populations.
Objectives: At the conclusion of this session, participants should be able to:

- Describe the benefits of utilizing the precautionary principle model as a means to increase public participation and transparency in the decision making process to prevent environmental health risks to children.

- Recognize the relation between prenatal exposures to environmental toxicants and subsequent increases in neurological, developmental disabilities and, other related health concerns contributing to an increase in learning and behavioral problems.

- Identify opportunities available to educational institutions, government agencies, health organizations, child advocacy groups, elected officials, and the general public to elevate the focus and discussion on the consequences of environmental health risks to pregnant women, infants and young children

- Relate how engaging public/private partnerships benefit health initiatives and prevention programs focused on preventing environmental health risks to pregnant women, infants and young children.

- Explain the urgent need to develop guidelines for purchasing toxic free products and adopt legislative polices for the removal of known or highly suspected environmental contaminants from children’s products.

Toxic chemicals in the environment harm our ability to reproduce, negatively affect pregnancies, and are associated with numerous other long-term health problems, according to The American College of Obstetricians and Gynecologists (The College) and the American Society for Reproductive Medicine (ASRM). In a joint Committee Opinion, The College and ASRM urge ob-gyns to advocate for government policy changes to identify and reduce exposure to toxic environmental agents (abstract is printed on page 34).
Thursday: 10:45  
PANEL: *Pediatric Environmental Health Specialty Units of the US Environmental Protection Agency and Agency for Toxic Substances and Disease Registry*

**Panelists:**

**Susan Buchanan, MD, MPH,** *Director of the Great Lakes Center for Children’s Environmental Health, Pediatric Environmental Health Specialty Unit, Clinical Assistant Professor at the University of Illinois Department of Environmental and Occupational Health Sciences, Chicago, IL*

**Jennifer Lowry, MD,** *Director, Pediatric Environmental Health Specialty Unit; Medical Director, Center for Environmental Health; Professor, Pediatric Pharmacology and Medical Toxicology, Children’s Mercy Hospital and Clinics, Kansas City, MO*

**Jerome Paulson, MD, FAAP,** *Director of the Mid-Atlantic Center for Children's Health and Environment, Professor, Department of Environmental & Occupational Health, Professor, Department of Pediatrics, The George Washington University School of Medicine and Health Science, Washington, DC*

**Moderators:**

**Martha Berger,** *Acting Director of Program Implementation and Coordination in the Office of Children's Health Protection at the U.S. Environmental Protection Agency*

**Michael Hatcher, Dr.PH,** *Chief of the Environmental Medicine and Education Services Branch at the Agency for Toxic Substances and Disease Registry*

The Pediatric Environmental Health Specialty Units (PEHSU) comprise a respected network of medical experts in children’s environmental health across the United States. The PEHSUs were created jointly by the Agency for Toxic Substances and Disease Registry and the Environmental Protection Agency to ensure that children and communities have access to, usually at no cost, special medical knowledge and resources for children faced with a health risk due to natural or human-made environmental hazards. The PEHSU network’s mission is to improve the environmental health of children by enhancing educational and consultative services to clinicians, health professionals and the community. In addition to clinical consultations, PEHSUs offer educational materials including presentations and fact sheets to communities concerned with exposures that may result in harm to children.
Over the past several years, the PEHSU Network has expanded to include exposures during pregnancy to their mission. The American College of Obstetrics and Gynecology (ACOG) has also recognized that reducing exposures to environmental hazards during pregnancy is critical to prevent adverse health outcomes in infancy, childhood, and across the life course. Over the past several years, PEHSU network members along with the Program on Reproductive Health and the Environment have been instrumental in supporting and promoting the development of a Reproductive and Children’s Environmental Health Working Group involving ACOG and the American Society of Reproductive Medicine. Using epidemiological and toxicological evidence, PEHSUs have been recognized as a science-based source of expertise to provide information to parents, communities and health care professionals when exposures occur. These consultations include exposures to pregnant women and those of reproductive age.

**Objectives:** At the conclusion of this session, participants should be able to:

- Describe how the Pediatric Environmental Health Specialty Unit Network uses practices and polices founded on evidence-validated research to improve reproductive health and minimize environmental health risks to children.
- Examine how ongoing epidemiological and toxicological studies have changed our concept of what is an “acceptable exposure”.
- Relate the purpose, design and partnerships involved in the Pediatric Environmental Health Specialty Unit Network educational campaign on environmental factors and children’s health.
- Understand how the PEHSU Network can be utilized by health care professionals and the general public for environmental exposures including those during pregnancy.
Laura Anderko, PhD, RN, Robert and Kathleen Scanlon Endowed Chair in Values Based Health Care, Robert Wood Johnson Executive Nurse Fellow Alumna, Professor, School of Nursing & Health Studies, Georgetown University, Washington, D.C.

Donald Dudley, MD, William T. Moore Professor of Obstetrics and Gynecology, Director, Division of Maternal-Fetal Medicine, Department of Obstetrics and Gynecology, University of Virginia School of Medicine

Leslie Myatt, PhD, Professor, Co-Director, Center for Pregnancy and Newborn Research, Department of Obstetrics and Gynecology, University of Texas Health Science Center, San Antonio

Moderators:
Martin Lorin, MD, Professor, Baylor College of Medicine, Attending Physician, Texas Children’s Hospital, Houston, CEHI Board Member
Vincent Torres, MSE, PE, MAC, Associate Director, The Center for Energy & Environmental Resources, The University of Texas at Austin, CEHI Board Member

Laura Anderko

There is a growing concern regarding the vast number of environmental exposures that can negatively impact reproductive health of both men and women, as well as the health of children through pre-conceptual and prenatal exposures to the mother and father. In the U.S. chemicals are handled with an “innocent until proven guilty” approach rather than “first do no harm”. This means that of the over 80,000 chemicals in use, only a few hundred have been tested for effects on human health. In addition to chemicals, our world is filled with electronic devices that emit a range of exposures such as microwave radiation from cell phones that has also been shown to impact reproductive health.

Everyday exposures to toxins such as pesticides, heavy metals, phthalates, bisphenol-A, polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs; flame retardants) can negatively impact growth and development in the fetus and may result in life-long adverse health effects such as infertility, birth defects, and cancers. These environmental exposures are ubiquitous and can be found in food, cosmetics, packaging, and furniture. Routes of exposure can include inhalation (e.g., particulate matter), ocular contact (e.g., chemical splash), ingestion (food contaminated with pesticides), dermal, (e.g., cleaning fluids), and/or intravenous (e.g., di(2-ethylhexyl)phthalate (DEHP)). More recently, concerns over microwave radiation from cellphones and its ability to negatively impact male reproductive health has emerged.
The Alliance of Nurses for Healthy Environments promotes healthy people and healthy environments by educating and leading the nursing profession, advancing research, incorporating evidence-based interventions into practice and influencing policy. Nurses are highly trusted health professionals and readily accessible to the general public in settings such as schools, the workplace, homes, and clinics. This provides valuable opportunities to educate men and women about the effects of toxins on health, and ways to reduce exposures through precautionary action. Examples of individual precautionary action steps include reducing use of cell phones, reducing use of plastics, avoiding foods high in pesticide residues, mercury, or PCBs, avoiding cosmetics and personal hygiene products that contain toxins, and eliminating the use of all pesticides in home or garden.

There are a number of resources available to families to help to inform and provide guidance in reducing exposures. However, more important is the need for chemical policy reform. There are a number of national campaigns that are advocating for strengthening efforts to protect the public from harmful environmental exposures in which mothers, fathers, nurses, and others can participate and become more informed, and ultimately, more involved in making change that will improve the public’s health.

**Objectives:** At the conclusion of this session, participants should be able to:

- Discuss the impact of environmental exposures on reproductive health, infertility and the development of toxicity to the fetus.
- Explain how the Alliance of Nurses for Healthy Environments promotes healthy people and healthy environments by educating and leading the nursing profession, advancing research, incorporating evidence based practice and influencing policy.
- Identify resources for educating women and their families about the effects of toxins on reproductive health and on offspring, including methods to reduce risks through precautionary action.
Laura Anderko Bibliography:


Donald Dudley

Pregnancy is the single most important event in the life of a specific individual as it relates to long term health and development. Environmental exposures to the mother during pregnancy can have profound effects on pregnancy outcome, child development, and adult health. Moreover, environmental exposures interacts with the genes of each individual in a unique way and so predicting outcomes based on exposures can be quite difficult. Further, these exposures can determine long term outcomes and potential adult disease. The so-called “fetal origins of adult disease” area of study attempts to assess fetal exposures and how these exposures can help to determine childhood and adult diseases. In this regard, the term “environment” is all encompassing, including maternal nutrition, occupational exposures, the home environment, air, water, noise, and social stress. All of these potential environmental influences can affect later adult disease. There are several well-known exposures during pregnancy that can lead to impaired neurodevelopmental outcomes, including lead, arsenic, and mercury. While these are well known, new research has indicated that exposure limits previously thought safe are in fact too high and new lower limits are needed. Several other exposures, such as to BPA and fire retardants, are only just now coming to light as potentially harmful to children. The vast majority of industrial chemicals have not been studied with regard to maternal and child outcome before going to market, thus leading to exposures on a population basis with unknown effects. Large national studies, such as the National Children’s Study, hold promise as a way to learn more about the potential negative, and positive, effects of pregnancy exposures on outcomes. These outcomes include not only child and adult disease, but also health. Some exposures may actually benefit general health, but these too remain essentially unknown. Only through a thorough knowledge of how exposures can lead to negative effects or positive benefits can we enhance pregnancy, childhood, and adult health.

Objectives: At the conclusion of this session, participants should be able to:

- Discuss how genetics and stage of development during gestation influence prenatal and early childhood susceptibility to disease from environmental health risk exposures.
- Relate that epidemiologic literature associates prenatal exposures to heavy metals, including mercury, lead and arsenic, with increased risk for neurodevelopmental problems, congenital malformations, and miscarriage.
- Explain the importance of undertaking an interdisciplinary research agenda, such as the National Children’s Study, in addressing environmental health risks to children, including community outreach and involvement.
Development of metabolic syndrome, obesity, diabetes, cardiovascular disease, neurobehavioral disorders and disorders of the reproductive axis are now known to be influenced by an adverse environment during the period encompassing in utero life and the early postnatal period (developmental origins of health and disease, (DOHaD)). The adverse environment can arise from exposure to environmental toxicants, an adverse physical or metabolic environment, food challenges, inappropriate exposure to developmental signals or exposure to life stressors. Human epidemiologic studies and animal models have demonstrated programming but as yet mechanistic studies are few. As epigenetic processes play a central role in regulating tissue-specific expression of genes and have been implicated in the pathogenesis of many human diseases. The epigenome can be modulated by the environment during specific developmental periods as an adaptive mechanism by which the organism can adjust its metabolism and homeostatic systems to suit the environment. Inappropriate adaptation may result in a metabolism mismatched to the environment and increased susceptibility for disease in later life.

The placenta, the interface between mother and fetus, regulates of fetal growth and development, anchors the conceptus, acts as the immune barrier, transfers gases and nutrients and secretes a variety of steroid and peptide hormones and growth factors that act both on mother and fetus. The placenta is not simply a conduit but as the “director” of pregnancy is an active participant in the programming phenomena. However the mechanistic relationship still needs clarification. Placental physical parameters, metabolic rate, steroid and peptide synthesis and transport functions can be measured and placental content of metabolites, xenobiotics and metals may serve as the “diary” of maternal and fetal exposure during pregnancy. Similarly redox state and the placental epigenome will serve as markers of in utero exposures and risk for programming.

Maternal obesity in pregnancy is associated with programming of offspring for metabolic disease in later life. We find that the metabolic environment of maternal obesity compromises placental respiration, thus placing the fetus at risk and that the placental epigenome is profoundly altered, affecting genes involved in regulation of maternal metabolism and fetal growth and development. We have potentially identified the mechanism linking maternal metabolism to epigenetic programming of the placenta. Prenatal exposures to a variety of chemicals can also cause developmental programming, resulting in weight gain and obesity later in life. Many of these “obesogens” are endocrine disrupting chemicals (EDCs) that can act as direct ligands for nuclear hormone receptors, or affect components in metabolic signaling pathways under hormonal control. An example is the organotin, tributyltin chloride (TBT) used in fungicides, miticides, wood preservatives, heat stabilizers in polyolefin plastics and antifouling paints.

Rates of obesity have increased in infants, suggesting prenatal or early childhood programming. Understanding the epigenetics and how environmental exposures, whether to under or over nutrition, or obesogens, in early life mediate changes in the epigenetic regulation of genes and long term consequences is essential in order to determine individuals at risk and for the development of therapeutic solutions to the obesity problem.
Objectives: At the conclusion of this session, participants should be able to:

- Discuss why the National Institute of Child Health and Human Development calls the placenta “the least understood human organ and arguably one of the more important, not only for the health of a woman and her fetus during pregnancy but also for the lifelong health of both.”
- Relate why increasingly, researchers think the mother’s external environment and the intrauterine environment she generates via her physiology act via the placenta to affect fetal growth and development and subsequent development of diseases as diverse as metabolic, cardiovascular, neurodevelopmental, behavioral and reproductive in later life in the offspring.
- Describe how the human placenta serves as a diary of exposure to environmental toxins to maternal medical conditions and predicts programming of offspring.
- Review the potential role of epigenetics in mediating programming of the offspring.

Thursday, 3:30  Documentary Film *Unacceptable Levels*

*A film about chemicals in our bodies... and how they got there.*

Unacceptable Levels examines the results of the chemical revolution of the 1940s through the eyes of affable filmmaker Ed Brown, a father seeking to understand the world in which he and his wife are raising their children. To create this debut documentary, one man and his camera traveled extensively to find and interview top minds in the fields of science, advocacy, and law. Weaving their testimonies into a compelling narrative, Brown presents us with the story of how the chemical revolution brought us to where we are, and of where, if we’re not vigilant, it may take us.

Unacceptable Levels opens the door to conversations about the chemical burden our bodies carry so that we can make informed decisions now and in the future. The film poses challenges to our companies, our government, and our society to do something about a nearly-unseen threat with the inspired knowledge that small changes can generate a massive impact.
The fetus and the child are particularly vulnerable to pollution. During early life, cell differentiation and brain development must happen in a particular sequence and at certain times to create optimal functions of the mature organism. The complexity of the human brain is therefore associated with unique vulnerability to chemical toxicants. Evidence on lead, methylmercury, organophosphate pesticides, and other environmental neurotoxicants has shown that serious damage may occur at doses deemed safe for adults, and that such damage may be permanent. There is only one chance to develop a brain, and deviations from optimal development will generally be adverse. In addition, we depend on optimal function of the brain, not just “normal” function as would usually suffice for other organ systems. In concert, neurotoxic exposures are causing a pandemic of chemical brain drain, which mostly appears to be silent, as only a small proportion is linked to clinical diagnoses. As a common complication, new research results are hidden by hedged language with caveats and disclaimers. Further, prevention efforts have been delayed or derailed by alleged uncertainties and by scientific desires for complete understanding of toxic mechanisms and disease pathogeneses. Despite documentation that over 200 chemicals can cause neurotoxic effects in humans, only a small number is recognized as causes of developmental brain dysfunction, and few of them are subject to proper controls. The incomplete scientific evidence is unlikely to be due to lack of toxicity in humans, but much rather due to lack of opportunities to document the consequences of developmental exposures. In addition, no systematic testing for developmental neurotoxicity is taking place. Because optimal brain function is crucial to each individual as well as to society, new and precautionary approaches are required both for research and for decision-making on chemical testing and protection of the next generation’s brains. The time has come to withdraw the obsolete and unethical dictum that “Differences in sensitivity between children and adults are chemical specific and must be studied and evaluated on a case-by-case basis”.
Objectives:  At the conclusion of this session, participants should be able to:

- Examine the public health implications of human exposures to an increasing number of chemicals potentially capable of damaging the developing brain in regard to increased prevalence of neurological/developmental disabilities.
- Analyze conflicting needs of individuals, society and the private sector in regard to the manufacture, use, toxicity testing and regulation of environmental toxicants.
- Compare public policies in the United States and the European Union in protecting the health of children in light of applying the precautionary principle in planning and interpretation of medical research and in development, manufacture, promotion and regulation of industrial products.
- Relate and translate research findings, including strengths and limitations, to possibilities for decision-making to control the manufacture, distribution and sale of children’s products containing contaminants that are suspected or known to constitute health hazards.
- Consider ethical responsibilities at individual and society levels to protect the next generation's brain development from chemical hazards.
The US is home to 390,000 faith communities. Over 80% of US citizens say that they believe in God. Furthermore, the largest faith communities in the United States – the Roman Catholic and Evangelical communities – both feature the protection of unborn life as a major issue of concern. According to the United Nations, the major faith groups have established, run, or contribute to over half of all schools world-wide, where children are educated and raised. The world’s faith traditions share values which can serve as a foundation for ethical decision-making regarding toxic chemicals. Clearly, faith communities are an enormously important stakeholder when it comes to addressing issues of prenatal environmental exposures.

In the 2000’s, several initiatives in the US helped raise awareness within faith communities about the dangers of toxic chemicals and the importance of policy reform. The National Council of Churches conducted efforts to educate mainline Protestant Christian communities about the health threats of toxic chemicals. The Evangelical Environmental Network carried out radio and TV ad campaigns in support of stronger protections from mercury poisoning. GreenFaith released an interfaith statement in support of reform for the Toxic Substances Control Act (TSCA), and worked with other faith groups to advocate for legislative reform of TSCA.

However despite these important efforts, faith communities have not become a significant force in efforts to reform laws related to toxic chemicals or prenatal environmental exposures. Partnerships are rare and uncoordinated between organized faith communities and medical and health professionals concerned with these issues. Despite the substantial opportunities for collaboration, no larger strategy or plan has been developed to advance an educational and legislative agenda that would reduce prenatal environmental exposure to toxic chemicals.

In this keynote, I will describe some of the history of religious efforts to address issues related to toxic chemicals and prenatal exposures. I will share excerpts from tv and radio ads designed to engage faith communities on these issues, and share teachings from diverse religions which speak to these concerns. I will also outline a strategy for long-term collaboration between medical and health professionals and religious communities on the issues of prenatal environmental exposures, offering concrete recommendations based on proven communication and campaign strategies within the religious sector. This presentation is designed to serve as a thought-provoking trial balloon, an opportunity to offer a vision for a new kind of collaboration that could mobilize a substantial new constituency on behalf of human health.
Objectives: At the conclusion of this session, participants should be able to:

- Reflect on the importance of engaging faith communities in addressing the connection between increasing environmental health risks and the dramatic increase in neurological and developmental disabilities, asthma, and other related health concerns.
- Explain why faith community administrators must consider environmental health risk exposures to pregnant women, infants and children when planning, renovating and building their facilities.
- Describe ways that faith communities currently participate in cross-discipline discussions with members of the built industry and health professionals on how to work more effectively to leverage efforts to establish good environmental health practices and policies.
- Review model programs and resources available to assist faith communities to support toxic-free healthy environments in their facilities.
- Discuss current opportunities and initiatives for the leadership from faith communities to participate with public and private partnerships to promote healthy environments for children and families.

Bibliography

Creation Justice Ministries (formerly the National Council of Churches Eco-Justice Working Group) - Environmental Health Materials and Resources - [http://www.creationjustice.org/educational-resources.html](http://www.creationjustice.org/educational-resources.html)


As geneticists decipher and interpret more and more of the human genome, we are learning that genes are not the only controlling factor for how an embryo develops. In fact, environmental and nutritional influences can be considered just as instrumental in driving proper human development, meaning they can also have detrimental effects. Recent research implicates several common environmental contaminants in improper embryonic and childhood development, with bisphenol-A (BPA) probably being the most studied. Additionally, studies have found that maternal nutritional health can have an effect on a pregnancy even before conception, and most certainly will affect a developing embryo. During this seminar, I will review scientific literature that highlights some of the important environmental and nutritional factors that can effect human embryonic development via interfering with physiological processes and/or altering the embryo’s genetic profile. Participants will learn the importance of proper nutrition during pregnancy, as well as how to avoid environmental factors that can modify normal human development. The molecular mechanisms behind these effects will be elucidated and participants will learn how these alterations in embryonic development can have long-lasting effects on the human body.

**Objectives:** At the conclusion of this session, participants should be able to:

- Review how the increasing prevalence of toxins in food is placing the health and intellect of current and future generations at risk.
- Discuss recent research reinforcing the need to educate expectant mothers on how to avoid exposure risks from environmental toxins in their foods.
- Consider the relationship between food, politics and how seemingly unrelated economic, political and social issues play a significant role in poor nutrition choices for many families.
- Explore options expectant mothers have to improve their consumption of toxin-free foods.
Roy Gunsolus, AIA, ACHA, LEED AP BD+C Principal and Senior Vice President, Director of Sustainable Healthcare, HKS Architects, Dallas, Texas

Claudia S. Miller, MD, MS
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Roger B. Perales, MPH, RS, CIEC
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Moderators:
Jules Elkins, PhD, Lecturer, Department of Geography and the Environment, University of Texas at Austin, CEHI Board Member
Mike Wells, AIA, NCARB
Senior Advisor, Center Development Bright Horizons Family Solutions, CEHI Board Member

Roy Gunsolus

As architects, we specify materials every day. Our decisions affect the environment, our communities, and our health. How much do we really know about these substances and materials that make up our building products? This question is taking more of a central place in the architectural practice. The American Institute of Architects recently named material health as one of their four top sustainability initiatives.

Consider the following:

- 40-50% of the total flow of materials/substances in the global economy are used in the manufacturing of building products worldwide (about 3 billion tons per year)

- In a 2005 study called “Body Burden: The Pollution in Newborns”, 287 chemicals were found in newborn blood. 180 have been linked to cancer, 217 are neurotoxins and 208 are linked to birth defects

- The Toxic Substances Control Act of 1976 is the only US law regulating toxic chemicals. This “law” exempted or “grandfathered” 62,000 chemicals (99% of the known chemicals at the time), that is they were assumed safe until proven otherwise. Since that time only 5 of these chemicals have been restricted under the law (asbestos, PCB’s or polychlorinated biphenyl, dioxin, CFC’s or chlorofluorocarbons, and hexavalent chromium)

- A recent study of toddlers in the US conducted by researchers at Duke University found flame retardants in the blood of every child they tested. These chemicals are associated with an assortment of health concerns, including antisocial behavior, impaired fertility, decreased birth weight, diabetes, memory loss, undescended testicles, lowered levels of male hormones and hyperthyroidism.
The fundamental issue is that thousands of different chemicals, many of them well recognized to be hazardous, are allowed to become components of building materials. The design and construction communities have begun to push back and have asked product manufacturers to be transparent about sharing the ingredients of their respective products. The philosophy of many architects/design professionals now reflects the Precautionary Principle which states that “when an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically”.

There have been several transformative entities in the building design and construction industry over the past two decades, especially USGBC’s LEED program. It has been instrumental in transforming the marketplace, starting in the area of volatile organic compounds (VOC’s). We can now specify VOC-free paint even with the pigment added, this is very different than our materials landscape was just 20 years ago. Several useful tools have now been developed that help inform our building materials selections including Pharos, Cradle to Cradle, Perkins + Will’s Precautionary List, Declare labels, and Health Product Declarations (HPD’s).

Architects are in a unique position to influence manufacturers to eliminate toxic chemicals and substances from the building products they provide and to educate owners to make informed decisions related to product selections. Together the design and construction communities will seek out alternatives that protect our health and the health of future generations. We have the ability to potentially impact asthma, autism, leukemia, childhood brain cancer, and other health issues as much as medicine itself! Imagine a Cancer Center without carcinogens, a pediatric clinic free of chemicals that trigger asthma, or hospitals with healthy food, fresh air, and plenty of sunlight!

**Objectives:** At the conclusion of this session, participants should be able to:

- Explain how the Health Product Declaration Collaborative, as a customer-led organization, is committed to the Health Product Declaration (HPD) as a means to improve the building industry’s performance through transparency, openness and innovation in the product supply chain.
- Describe how architects, builders and project administrators can protect children and families from health risks by incorporating environmentally related health standards and policies in their practices.
- Identify reputable certified rating services for green building materials, products, and avoid entities simply promoting greenwashing.
Claudia Miller

Radically Rethinking Our Approach to Medicine: Diagnosis and treatment of chronic medical conditions using Environmental Medical Units (EMUs)

Since World War II, over 80,000 synthetic chemicals have entered our environment. A significant body of research is emerging linking chemical exposures to a vast array of health problems—including autism, AD/HD, autoimmune disease, asthma, allergies, affective (mood) disorders, and addiction (what I call the 7 A’s). Each day, countless individuals suffer from exposure-related symptoms and illnesses with nowhere to turn for answers. Whether flight attendants exposed to engine exhaust, families in newly built or remodeled homes, or Gulf War Veterans, these individuals experience a host of physical and mental symptoms as well as new intolerances—foods, chemicals and medications—that had never bothered them before. They migrate from doctor to doctor looking for answers—“revolving door medicine.” Their doctors simply do not have the training or diagnostic tools needed to understand the two-step process that underlies many of these conditions—Toxicant-induced Loss of Tolerance (TILT).

Our society urgently needs to invest in Environmental Medical Units (EMUs). An EMU is a specialized inpatient hospital unit where individuals can be systematically isolated from ambient environmental exposures. The unit is constructed, furnished, and operated to minimize exposure to airborne chemicals. For example, no disinfectants, perfumes, or pesticides are allowed, and patients consume organic foods and clean water. After several days in the EMU, subjects return to “baseline.” Patients are then exposed to low-level, controlled challenges with a variety of substances. Removing all potentially harmful exposures can provide relief, but an EMU’s main goal is to identify particular symptom triggers, so patients can avoid them and regain tolerance. Most individuals are unable to discern the effects of any particular exposure—the background symptom “noise” is simply too high. This is known as “masking.” By eliminating background noise, EMUs would allow us to measure relevant physiological functions—EKG, EEG, brain imaging—and to monitor gene/protein expression pre- and post-isolation and challenges—an approach that will allow us to identify biological pathways affected by toxicants.

What can we do to protect more susceptible adults and their offspring?

1. Use the QEESI to identify the most susceptible individuals
2. Perform Environmental House Calls to reduce exposures in their homes
3. Incorporate EMUs in every major medical center in order to evaluate and treat chemically susceptible adults and children

An EMU is a relatively modest investment that has the potential to reap tremendous dividends in scientific knowledge and the relief of human suffering. Chemical intolerance may be the most prevalent environmentally related condition in the country, estimated to affect 20% of individuals with chronic illness. We need to radically rethink our approach to medicine and redesign hospitals and health care facilities to accommodate the most sensitive subset of our population. By protecting the most vulnerable individuals, we protect everyone.
Objectives: At the conclusion of this session, participants should be able to:

- Describe an Environmental Medical Unit (EMU) and how it would be used for research, diagnosis and treatment?
- Explain how Toxicant-induced Loss of Tolerance or TILT is a two-step process that is both initiated and, later triggered by environmental exposures.
- Identify the 7 A’s (7 chronic medical conditions confronting children’s health that have increased in prevalence in recent decades and could be potentially treated in an EMU (Environmental Medical Unit (EMU)
- Relate why indoor air quality is an important health issue, especially for vulnerable populations such as pregnant women, infants and young children.
- Discuss why municipal planners, physicians, and public health officials fail to hold the built environment accountable for exposing pregnant women and children to environmental health risks.
- Summarize methods for reducing unnecessary exposure to harmful pollutants by pregnant women, infants and young children in both public and private buildings.

Roger B. Perales

Environmental House Calls: A practical approach for protecting future generations

Within the last 60 years, thousands of new chemicals have been introduced into our lives and homes, yet little is known about the long-term health effects of low-level chemical exposures on the developing brain. Increasingly, researchers today suspect exposures to various medications, pesticides, traffic exhaust, plasticizers, and flame retardants, to name a few, could play a role in the rising numbers of children diagnosed with neurodevelopmental disorders.

For the past 20 years, we have been conducting “Environmental House Calls” in the homes of children with asthma. Along the way, we expanded our environmental assessments to include other potential sources of indoor air pollution, household hazardous materials, heavy metals and other toxicants that can adversely affect children, adults and pregnant women.

This presentation will address:
- Exposures of concern during pregnancy and early childhood
- Discuss some of the key findings and recommendations for reducing environmental exposures
- Describe teaching methods that factor in the home environment for health professionals, students and the community

In the absence of definitive scientific Information, expectant mothers can take precautions by reducing unnecessary exposures during pregnancy. The best odor in the house is no odor. The nose is the best weapon. If you smell something, you are inhaling molecules.

Objectives: At the conclusion of this session, participants should be able to:

- Name 5 things expectant parents do that can adversely affect indoor air quality in their homes.
- Describe 6 potential sources of indoor air pollution.
- Explain the advantage of conducting an Environmental House Call to help identify, and educate residents about, potential exposures.
- Identify household products and practices that can reduce unnecessary exposures during pregnancy.
Laura Anderko, PhD, RN, holds the Robert and Kathleen Scanlon Endowed Chair in Values Based Health Care at Georgetown University School of Nursing & Health Studies. She is a scholar and educator in the fields of epidemiology, public health and environmental health. A Robert Wood Johnson Executive Nurse Fellow, Dr. Anderko earned her Ph.D. in Public Health from the University of Illinois, an MS from Northern Illinois University, and a BSN from University of Illinois. Dr. Anderko is a former member of the Environmental Protection Agency’s federal advisory committee, the Children’s Health Protection Advisory Committee (CHPAC) and the National Drinking Water Advisory Committee (NDWAC). She is currently serving on the National Environmental Justice Advisory Committee’s (NEJAC’s) Research Workgroup and is a member of the Mid-Atlantic Health Equity Council for the Office of Minority Health, HHS. Dr. Anderko has received numerous awards for her work in environmental health. In July 2013, she was honored as a White House Champion in the area of Climate Change and Public Health.

Susan Buchanan, MD, MPH, is Director of the Great Lakes Center for Children’s Environmental Health Region 5 Pediatric Environmental Health Specialty Unit (PEHSU) at the University of Illinois at Chicago (UIC) School of Public Health. Dr. Buchanan is board certified in Family Medicine and Occupational and Environmental Medicine. She teaches occupational and environmental medicine including children’s and reproductive environmental health topics in the UIC Family Medicine Department, School of Public Health, and Occupational Medicine Residency Program. Her research interests include the occupational health of vulnerable populations including day laborers and prenatal exposures to environmental pollutants. Most recently she has completed research on methyl mercury exposure among high-risk groups including pregnant women.

Jeanne A. Conry, MD, PhD, FACOG, is the Immediate Past President of the American Congress of Obstetricians and Gynecologists, a membership organization representing over 57,000 practicing obstetricians and gynecologists. She is spearheading efforts on the National Maternal Health Initiative, a collaborative project that addresses improved maternal outcomes. Her Presidency has carried three key messages: improved efforts with Quality and Safety in Maternity Care, the Well Woman Task Force, a collaborative effort of organizations that provide women’s health care by balancing reproductive choice and improved health conditions for women, and guideline development and national policy about Reproductive Health and the Environment. In ACOG, District IX, California, she oversaw the Interconception Care Project and led statewide efforts to reduce elective deliveries before 39 weeks. Dr. Conry serves as a member of the Select Panel on Preconception Care; The UCSF Pregnancy Exposure to Environmental Chemicals Children’s Center and is a member of the National Business Group on Health, and the National Advisory Environmental Health Sciences Council. Dr. Conry received the Environmental Achievement Award from the United States Environmental Protection Agency and she received the Visionary Leadership Award from the University of California San Francisco. Dr. Conry has been a practicing obstetrical gynecologist at Kaiser Permanente for 25 years. She earned her medical degree at the University of California, Davis, where she also completed her residency in obstetrics and gynecology and earned a Doctor of Philosophy degree in Biology from the University of Colorado. She serves as an Associate Clinical Professor at the University of California, Davis.
Donald Dudley, MD, is currently the director of the Division of Maternal Fetal Medicine at the University of Virginia. He graduated from medical school at the University of Texas Health Science Center at San Antonio and then completed residency at the University of Iowa. He pursued fellowship training at the University of Utah and then was a faculty member at Utah and then at UT San Antonio before his recent move to Virginia. His research focus is on the study of adverse pregnancy outcomes such as stillbirth and preterm birth. He has been a board member of CEHI for the past several years, stemming from his long term involvement in the National Children’s Study. He was a founding member of the Federal Advisory Committee for the Children’s Study from 2002-2006 and is currently on the Publications Committee and the Obstetric Terminology committee for the NCS.

Philippe Grandjean, MD, DMSc, is Professor and Chair of Environmental Medicine at the University of Southern Denmark, Odense, Denmark and, since 2003, Adjunct Professor of Environmental Health at Harvard School of Public Health. He is also Consultant in Toxicology at the National Board of Health, Denmark. He serves on editorial boards of several scientific journals and in 2002 became a founding Editor-in-Chief of “Environmental Health”. He is a member of the scientific committee of the European Environment Agency, and he also serves on the World Health Organization’s advisory committee on health research. Most of his scientific publications relate to adverse effects in children exposed to chemical pollutants during early development. He wrote the chapter on “Science for precautionary decision-making” for EEA’s “Late Lessons of Early Warnings” (2013). His book “Only on chance - How Environmental Pollution Impairs Brain Development – and How to Protect the Brains of the Next Generation” was published by Oxford University Press last year.

Roy Gunsolus, with over 30 years of experience, specializes in healthcare facilities. He has managed over 5 million square feet of healthcare projects including green field hospitals, additions and renovations, outpatient facilities, specialty centers, etc. In addition, Roy serves as HKS’s Director of Sustainable Healthcare. He is responsible for educating the firm’s healthcare staff as well as assisting project teams in assessing and implementing sustainable initiatives. Roy is directly involved with several of the firms sustainable projects including his current project at Tradition Medical Center in Port St. Lucie, Florida. He has spoken at several conferences including the Design Futures Council Leadership Summit, CleanMed, the Planning, Design, & Construction (PDC) conference and the Healthcare Design (HCD) conference. He has also served as a guest lecturer on sustainability at Texas Tech University and the University of Texas at Arlington and has written several articles for professional journals including Health Facilities Management and Medical Construction and Design.
**Claudia S. Miller**, MD, MS, is Visiting Senior Scientist at the Harvard School of Public Health and Professor of Environmental Medicine at the University of Texas School of Medicine in San Antonio. Highlights of her research and teaching include: environmental house calls for children with asthma, sick building investigations, Gulf War illness, training medical students in environmental health, risk factors for autism and AD/HD, and the development of new biomarkers for environmental exposures. An industrial hygienist for 12 years, Dr. Miller went on to medical school at the University of Texas Health Science Center in San Antonio and completed an Internal Medicine residency and a fellowship in Allergy/Immunology. She also holds a Master's Degree in Environmental Health from the University of California-Berkeley School of Public Health. Dr. Miller is Founding Dean for one of the first 4-year MD/MPH programs in the Nation. Along with Dr. Nicholas Ashford, of MIT, she co-authored the professionally acclaimed book Chemical Exposures: Low Levels and High Stakes (2nd ed. Wiley). She is best known for describing a new disease mechanism—Toxicant-induced Loss of Tolerance (TILT)—and her groundbreaking research on the health effects of low-level chemical exposures. Dr. Miller is the leading proponent for Environmental Medical Units (EMUs) for research, diagnosis and treatment of chronic illnesses among susceptible individuals. She developed the “QEESI” or Quick Environmental Exposure and Sensitivity Inventory (pronounced “queasy”), a published and validated questionnaire used internationally as a screening and research tool for chemical intolerance (www.qeesi.org).

**Fletcher Harper**, an Episcopal priest, is Executive Director of GreenFaith, a national interfaith environmental coalition. An award-winning spiritual writer and widely-recognized preacher on the environment, he has developed a range of innovative programs to make GreenFaith an international leader in the religious-environmental movement. A graduate of Princeton University and Union Theological Seminary, Harper served as a parish priest for ten years prior to joining GreenFaith. He accepted GreenFaith’s Many Faith’s, one Earth Award from UN Secretary General Ban Ki-moon in 2009 and was named an Ashoka Fellow in 2011. He is the author of GreenFaith: Mobilizing God’s People to Protect the Earth (Abingdon Press, March 2015).

**Jennifer Lowry**, MD, attended medical school at the University of South Dakota School of Medicine in Vermillion and Rapid City, South Dakota. Subsequently, she completed a Pediatric Residency and Clinical Pharmacology/Medical Toxicology Fellowship at the Children’s Mercy Hospital and Clinics in Kansas City, MO. She is board certified in Pediatrics and Medical Toxicology. She spent 5 years at the University of Kansas Medical Center as the Medical Director to the University of Kansas Hospital Poison Control Center. Currently, she is the Chief for the Section of Clinical Toxicology at Children’s Mercy Hospital and an Associate Professor in Pediatrics at the University of Missouri – Kansas City School of Medicine. She continues to serve as a toxicologist for the KUH-PCC. She has served as the Director for the Mid-America Pediatric Environmental Health Specialty Unit (PEHSU) for EPA Region 7 (Iowa, Kansas, Missouri and Nebraska) since its inception in 2002 and as a medical toxicology liaison to the Region 7 Agency for Toxic Substances and Disease Registry. Additionally, she serves as the Steering Committee Chair for the PEHSU National Network. She is a current member of the Children’s Health Protection Advisory Committee for the Environmental Protection Agency and the Executive Committee for the American Academy of Pediatrics’ Council on Environmental Health. She is a frequently invited lecturer on pediatric toxicity and environmental exposures in the region. In addition, she has been Co-Director to multiple courses on toxicology and pediatric environmental health.
Leslie Myatt, PhD, is Professor of Obstetrics and Gynecology and Director of the Center for Pregnancy and Newborn Research at the University of Texas Health Science Center San Antonio. Dr Myatt received both his BSc and PhD from the University of London, UK. He moved to Texas in Jan 2009 having been a faculty member at the University of Cincinnati for 22 years and Director of the NIH-funded Physician Scientist Training Program (MD/PhD) and the Women’s Reproductive Health Research Scholars Program. Dr Myatt served as North American Editor of the journal Placenta (1997 to 2004), President of the Perinatal Research Society (1997), President of the International Federation of Placenta Associations (2002 to 2004) and President of the Society for Gynecologic Investigation (2009 to 2010). Dr Myatt’s research interests are control of fetal placental vascular reactivity, the role of obesity, oxidative and nitrative stress in placental function and fetal programming and the regulation of prostaglandin synthesis and action in intrauterine tissues at parturition. His current work focuses on the role of the maternal adiposity on epigenetic regulation of placental function and on placental mitochondrial energetics. He has published over 240 papers and 350 abstracts and has served on many review panels and study sections for NIH, CIHR and other international grant giving bodies. He was elected as a Fellow (ad eundem) of the Royal College of Obstetricians and Gynaecologists in 2013 for his contributions to women’s health research.

Meredith Oltmann, PhD, is currently an Assistant Professor of Biology at Concordia University, teaching classes in Human Nutrition, Developmental Biology, Cell & Molecular Biology, Biopsychology, and Anatomy & Physiology. Dr. Oltmann's Ph.D. is from the University of California, Los Angeles, where she studied the genetic control of embryonic cardiovascular development in the lab of Dr. Gerry Weinmaster. More recently, Dr. Oltmann was a Visiting Scientist in the lab of Dr. Richard Finnell at the Dell Pediatric Research Institute at the University of Texas at Austin, where she was involved in research focusing on the role of folic acid during embryonic development, and specifically neural tube formation. Her research and teaching interests intersect as she teaches undergraduate courses in Human Nutrition, as well as Developmental Biology, thus exploring the genetic pathways that control human embryonic development, and the environmental and nutritional influences that can affect these intricate processes.

Jerome A. Paulson, MD is Professor of Pediatrics and Professor of Environmental & Occupational Health at the George Washington University Schools of Medicine and of Public Health. He is the Medical Director for National & Global Affairs of the Child Health Advocacy Institute and director of the Mid-Atlantic Center for Children’s Health at the Children’s National Medical Center. Dr. Paulson chairs the executive committee of the Council on Environmental Health of the American Academy of Pediatrics and serves on the Children’s Health Protection Advisory Committee for the US EPA. In 2004 he was a Dozor Visiting Professor at Ben Gurion University in Beer Sheva, Israel. He was a recipient of a Soros Advocacy Fellowship for Physicians from the Open Society Institute and worked with the Children’s Environmental Health Network, and has also served as a special assistant to the director of the National Center on Environmental Health of the CDC working on children’s environmental health issues.
**Photography**

We want to thank Teri Mason Photography for providing the beautiful photos for our symposium. Teri Mason is an internationally recognized portrait artist whose work has been featured in magazines and on television. Teri specializes in contemporary portraits of families, from maternity/newborn through high school seniors. With over twenty-five years experience working with children of all ages, Teri is able to coax perfect expressions from even the most reluctant subjects. Visit her studio, located on ten beautiful acres in Central Texas, or commission a session at a location of your choice (available for domestic and international travel). You can see more of her work at [www.MasonPhoto.net](http://www.MasonPhoto.net). Contact 512-930-1902 or [studio@masonphoto.net](mailto:studio@masonphoto.net).
Exposure to Toxic Environmental Agents

ABSTRACT: Reducing exposure to toxic environmental agents is a critical area of intervention for obstetricians, gynecologists, and other reproductive health care professionals. Patient exposure to toxic environmental chemicals and other stressors is ubiquitous, and preconception and prenatal exposure to toxic environmental agents can have a profound and lasting effect on reproductive health across the life course. Prenatal exposure to certain chemicals has been documented to increase the risk of cancer in childhood; adult male exposure to pesticides is linked to altered semen quality, sterility, and prostate cancer; and postnatal exposure to some pesticides can interfere with all developmental stages of reproductive function in adult females, including puberty, menstruation and ovulation, fertility and fecundity, and menopause. Many environmental factors harmful to reproductive health disproportionately affect vulnerable and underserved populations, which leaves some populations, including underserved women, more vulnerable to adverse reproductive health effects than other populations. The evidence that links exposure to toxic environmental agents and adverse reproductive and developmental health outcomes is sufficiently robust, and the American College of Obstetricians and Gynecologists and the American Society for Reproductive Medicine join leading scientists and other clinical practitioners in calling for timely action to identify and reduce exposure to toxic environmental agents while addressing the consequences of such exposure.

For the full Joint Committee Opinion got to [http://www.acog.org](http://www.acog.org), click on Resources and Publications and enter in search search Joint Committee Opinion #575.