

Report 80: Preventing Prenatal Exposures to Toxicants

Convener: Karin Russ

Brief History: The problem of prenatal exposures to toxicants is of the utmost concern to our society today. The effects of prenatal exposures range from the short term, evident in infants and children, to long term effects that may not be seen until adulthood. Birth defects affect 3-4% of all babies, and some 2/3 of those are of unknown etiology. In addition to the pain and human suffering associated with short and long term effects of toxicants, the economic impact of birth defects and chronic diseases is a substantial burden to our society.

NIEHS needs to take steps to ensure the prevention of prenatal exposures to toxicants. Studying the causes of birth defects, neurodevelopmental and functional disabilities, and adult diseases of fetal origin will advance environmental science in many ways. Studying prenatal exposures will provide insight on genetics, epigenetics, mechanisms of action, and effects of complex chemical mixtures. It is crucial to know the associative or causative relationships of toxicants and prenatal outcomes, because the prenatal period is a vulnerable window of development, and a period in which interventions that prevent or limit exposures may yield the greatest cost/benefit ratio. In addition, now is the time to undertake studies at the cellular and molecular level, because emerging technologies make such research possible.

Discussion Highlights: Birth defects are a major public health concern, and have not improved much in the last few decades, despite efforts to improve maternity care. Some types of birth defects that may be associated with environmental exposures, such as hypospadias and neurodevelopmental disabilities, have risen sharply over the last 20 years. The main factor that limits the ability to assess trends in birth defects is the lack of a national birth defects registry. Currently, 30-40 states have birth defect monitoring programs that capture only the major structural defects evident in the first year of life, such as cardiac anomalies, defects in limb development, cleft lip and palate, and hypospadias. One birth defects research group, funded through the CDC, is endeavoring to collect data on congenital anomalies in a more comprehensive way. The birth defects research group gathers information from 6-7 states via birth certificates (which describe only about 10% of the defects eventually found), and also from records from cytogenetic labs, surgical records, and ICD-9 codes from hospital admissions. This is a start in understanding the scope of the birth defect problem, but still does not represent the entire US. A better example of comprehensive reporting is the National Childhood Cancer Registry, through the Pediatric Oncology Group at the NCI.

Assessment is the first step in working toward prevention of prenatal exposures to environmental toxicants. Education of prospective parents on environmental risks is an important component of prevention. Finally, studies in teratology and clinical interventions can begin to evaluate which measures are most effective in reducing negative pregnancy outcomes.

Recommendations: NIEHS should take the follow steps to ultimately prevent prenatal exposures to toxicants:

Assessment

- **From an Inter-Agency Task Force on Birth Defects and Functional Outcomes.**
Multiple agencies are involved in the tracking and study of birth outcomes in the US. Recommended members of the Task Force include: NIEHS, NICHD, ATSDR, CDC, EPA, NCI and OSHA. In this way, a coordinated effort at assessing, tracking and conducting research, without gaps in research or duplication of effort, can be advanced.
- **Create multidisciplinary research teams, to better understand the multifactorial nature of prenatal exposures, birth defects and later life diseases.**
Team members may include toxicologists, teratologists, developmental biologists, epidemiologists and clinicians.
- **Promote cross-agency collaboration between the NIEHS and NCI.**
This partnership will allow for identification of childhood cancers that may have origins in fetal exposures to toxins. Suggested activities include: recommend that NCI collect an environmental exposure history from families of childhood cancer patients, recommend that NCI collect tissue for banking from registry patients, conduct GIS mapping of cancer incidence. These actions can inform the direction for future areas of study at NIEHS.
- **Promote improved screening of pregnant women for environmental exposures, including an occupational health history.** A primary activity within this action would be the identification or creation of a prenatal environmental health history screening tool, and the broad dissemination of this tool to health care professionals. Collaboration with professional organizations of healthcare providers delivering OB care, such as ACOG, ACNM, and NPWH is a critical step toward this goal.
- **Create an electronic environmental health assessment tool for the coming of Electronic Health Record (EHR)**
The EHR, mandated by the Healthcare Affordability Act of 2009, will provide an unprecedented opportunity to assess, track, monitor and analyze environmental health exposures. A standardized environmental health assessment tool for prenatal patients will greatly facilitate the collection and utilization of environmental health data, and will allow for early detection and a clinical guidance on risk reduction strategies.

Health education

- **Maintain a repository of health education materials for pregnant women.**
There is a vast array of health education material available for women of reproductive age, designed to help them reduce their risk of exposure to environmental hazards. NIEHS would be the ideal agency to collect and house this information on one webpage.
- **“Tweets for Teens”.**

Adolescents are a group at high risk for unintended pregnancies, and also for high risk behaviors that may expose them to toxicants. Utilizing Twitter technology to deliver prevention messages would be an effective way to reach this population. An exemplar that is already in place, delivering general messages about prenatal care, is the Text4Baby program.

- **Engage in studies to determine what methods of environmental health education are the most effective in changing behavior.** Traditional methods rely on pamphlets for distribution at health care providers' offices, website materials, or live presentations to groups of learners. Evidence of the efficacy of these vs. newer technologies such as Twitter or social marketing would help guide future health education efforts.

Areas for future research

- **Revive programs that fund studies on teratology.**
Funding for basic research on teratology has dwindled in recent years and needs to be restored.
- **Promote and fund intervention studies.**
Potential examples include: adverse effects of herbal preparations and complementary medicines, supplementary dietary choline to prevent neural tube defects, alcohol and smoking intervention for youth at high-risk for pregnancy.

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