

Kim Boekelheide, M.D., Ph.D.

Expertise: life-long professional interest in male reproductive tract toxicity resulting from environmental and occupational exposures

- Member, National Advisory Environmental Health Sciences Council, 2011-2014
- Member, Expert Panel, EPA Cumulative Risk Assessment of Phthalates Workshop, Washington, DC, December, 2010
- Organizer, National Academy of Sciences Workshop on *Use of In Utero and Postnatal Indicators to Predict Health Outcomes Later in Life*, Washington, DC, October, 2010
- Member, Review Panel/Site Visit, EPA Reproductive Developmental Toxicology Division, 2006
- Member, Di-(2-ethylhexyl)phthalate Expert Panel of the National Toxicology Program Center for the Evaluation of Risks to Human Reproduction, 2005
- Vice-Chair, U.S. Consumer Product Safety Commission's Chronic Hazard Advisory Panel on Di-isononyl Phthalate, 2000 – 2001
- Member, Phthalates Expert Panel of the NTP Center for the Evaluation of Risks to Human Reproduction, 1999 – 2000

Publications: ~170 total; 28 with *phthalate* identified as a search term from 1992-present

Relevant funding:

- NIEHS R01ES017272 *Molecular Mechanism of Human Fetal Testis Susceptibility to Endocrine Disruption*
 - 12/2009 – 11/2015
 - Total costs ~\$2.5M
- NIEHS P20ES018169 & EPA RD-83459401 *Formative Center for the Evaluation of Environmental Impacts on Fetal Development*
 - 02/2010 -02/2014
 - Total costs ~\$2M
- NIEHS R21 ES013020 *Phthalate-induced Murine Testicular Dysgenesis and p53*
 - 05/2005-02/2008
 - Total costs ~\$400K
- American Chemistry Council *Development of an inter-species bioassay to test phthalate susceptibility*
 - 2/2009-11/2011
 - Total costs ~\$350K
- American Chemistry Council *Di-n-Butyl Phthalate-induced Multinucleated Germ Cells*
 - 11/2011-12/2013
 - Total costs ~\$100K

Phthalate-related Disclosures:

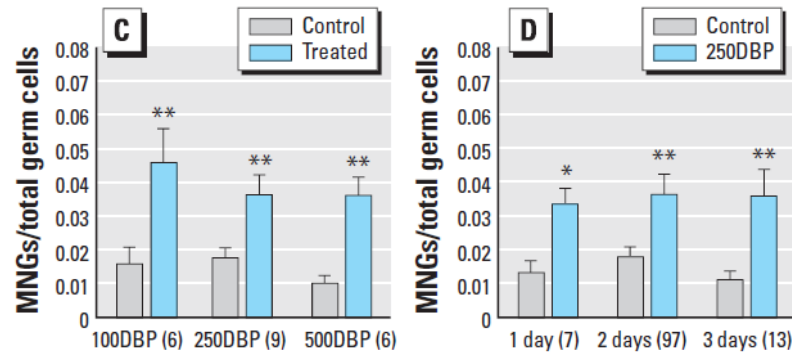
- Owner of small amount of Exxon-Mobil stock (gifted from my mother-in-law).
- Gave 10 seminar presentations at meeting and workshops in 2013-2014, including:
 - *Species Differences in the Developing Male Reproductive Tract Response to Phthalates: Implications for Human Risk Assessment*, Exxon-Mobil Biomedical Sciences, September, 2013 (invited seminar speaker with honorarium)
 - *Endocrine Disruptors and Reprotoxicity*, 20th International Plasticizers Meeting, Brussels, Belgium, May, 2013 (invited workshop speaker)

I am a National Academy of Sciences supported independent expert at this February EPA IRIS meeting, and I have not discussed or reviewed my comments or presentation materials with any interested parties.

Science Question 5. Relevance of non-androgen related male reproductive effects

- A consensus has developed that phthalate-induced fetal testis seminiferous cord effects are conserved across species
 - In general, the seminiferous cord effects are less well understood than the anti-androgenic effects
 - Vulnerable developmental windows of exposure and dose-response are less certain
 - Consequences of exposure are less certain
 - ❖ Potential overlap of effects due to anti-androgenic and seminiferous cord mechanisms
 - Measures of effect are less certain
 - ❖ Multinucleated germ cells (MNGs) are an easily measured biomarker of effect
 - since these end-stage degenerating cells die, they do not inform us regarding later life consequences of exposure

MNG induction across various doses and multiple days



Heger et al., Environ health Perspect 120:1137 (2012)

- Recommendations
 - Need studies of species (like mice) with less of an anti-androgenic response
 - To investigate the mechanistic differences in steroidogenesis across species
 - To determine later life consequences of seminiferous cord effects
 - Need additional mechanistic studies of human fetal testis response to phthalates