PPTOX IV: Summary and Some Thoughts

Jerrold J. Heindel, PhD
National Institute of Environmental Health Sciences

heindelj@niehs.nih.gov
Who would have thought? *With a name like PPTOX, that we would have such a successful series of meetings?*

And...we continue to grow:

- **PPTOX IV:** exceeded every previous meeting in numbers!
  - 326 attendees, many walk-in’s from Harvard, BU, & Mass General
  - 130 posters
  - 64 presentations
  - 20 Travel awards given
  - We have 25 countries represented.
  - ~70% from the US
  - ~30% from outside the US (5% are from developing countries)
  - Scientists in basic, translational, clinical and public health.
  - 32% are Early Career (grad students, post docs, ESI’s) representing the next generation in this growing field.
Not only the Biggest PPTOX, but also the Best Looking!

According to Ollie Rando...

“This is the best (or second best) dressed audience I have ever spoken to”

Congratulations to us!
SHOWCASE YOUR RESEARCH!

ENDO 2015

THE ENDOCRINE SOCIETY’S 97TH ANNUAL MEETING & EXPO

March 5-8, 2015 | San Diego, CA

Abstract Submission Deadline:

November 12, 2014 1:00 PM EST

Learn more at endo2015.org
PPTOX IV

health exposure development

environment

offspring

DNA integration cohort

life epigenetic metabolism origin

prenatal transgenerational

dohad

National Institutes of Health • U.S. Department of Health and Human Services
PPTOX I vs PPTOX IV and the future of PPTOX

- Epigenetics: potential mechanism of developmental change
- Transgenerational inheritance
- Placenta: important mediator of exposure and potential biomarker
- Inflammation, stress, nutrition
- Sexually dimorphic response to exposure
- Exposome and Biomonitoring: emerging chemicals, combined exposures
- Immune response
- Obesity, diabetes
- Microbiome
- Two hit hypothesis
- Global DOHaD concept
- Integration of fields
A few Highlights

People are starting to think there might be something to this transgenerational stuff.

- Transgenerational (or multigenerational) effects can be induced by a wide range of factors, including chemical exposures, dietary changes, and other stressors...including environmental exposures in relevant ranges.
- There is also a wide variety of endpoints...

“Its not my fault I am a Yankees fan, it is transgenerational inheritance from my grandparents to parents to me”.....it is a plea for help to understand the mechanism of this inheritance and to intervention strategies.

Michael Liarosa
Importance of the Placenta

- Mediates transport of chemicals from the mother to the fetus
  - Nutrients, gases, waste, hormones, chemicals
- Immune, metabolic, and endocrine functions
- Sexually dimorphic
- Potential biomarker of exposure

“The placenta is the guardian of the fetus.”
-Carmen Marsit
Sexual Dimorphism/ Sex Differences

• Disruptions in steroid hormones have wide-ranging effects on multiple disease endpoints.

“You can not rule out sex differences in any disease process”
- Deborah Cory-Slechta

“In humans prenatal stressful life events may exert androgenic action and alter sexually dimorphic developmental endpoints. …girls but not boys with a history of more stressful life events had more masculinized play behavior.”
- Shanna Swan
Key Quotes:

• Chirag Patel, “With EWAS it is now possible to build a search engine to find environmental exposures in diseases”

• “Today no one is laughing at the idea developmental origins of CVD” John Erickson

• “The concept of endocrine disruption should be extended to non chemical stressors” Shanna Swan

• “Phthalates are protective against stress” Shanna Swan

• Mothers already know that….
Epidemiology DOHaD Studies...

- Pelagie
- Tides
- Moba
- Nest
- Home
- Obelix
- Enrieco
- Avon
- Pace
- Chef

- Improved exposure assessment
- Multiple endpoints/diseases
- Expanding times
- Epigenetic assessment, biomarkers
- New focus area: Epidemiological, epidididymal epigenetics

- New Hampshire Birth Cohort Study of Children and Families?
Final Thought
Based on what we know...

Societies that foster poverty, chronic violence, rampant inequalities, persistent discrimination, racism, poor nutrition, air pollution and uncontrolled exposures to toxic environmental chemicals.....

Should be charged with violating the rights to health of individuals and ensuing generations.

Modified from, the Lure of the Epigenome, Margaret Lock Lancet 381: 2013