

# TEDX

The Endocrine Disruption Exchange

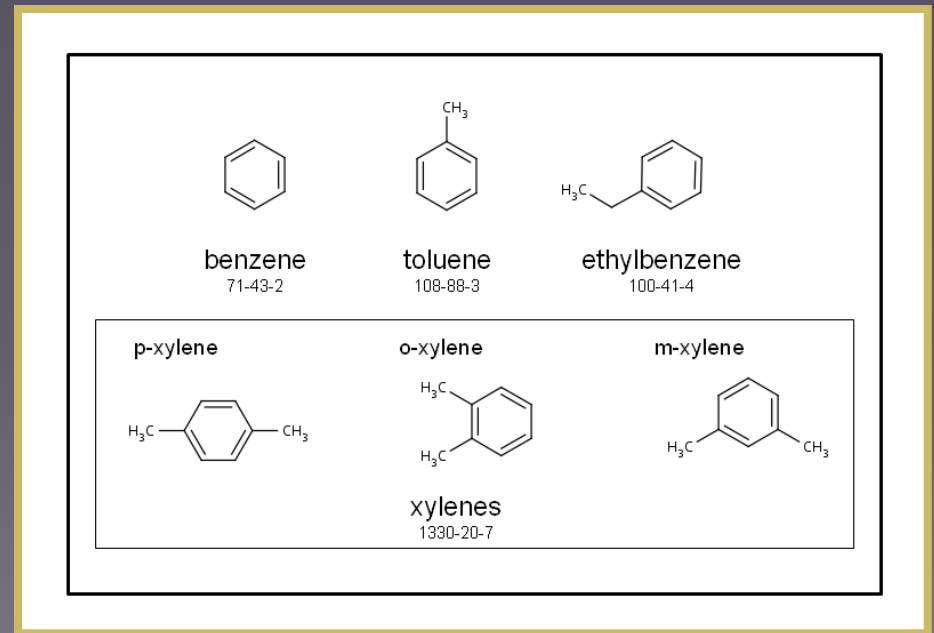
## **A New Look at BTEX: Are Ambient Levels a Problem?**

Bolden AL, Kwiatkowski CF,  
Colborn T. Environ. Sci. Technol.  
2015, 49 (9), 5261–5276.

Carol Kwiatkowski, PhD  
Executive Director  
The Endocrine Disruption Exchange

# Benzene, Toluene, Ethylbenzene, and Xylenes

- Hazardous air pollutants (EPA)
- Precursors to other known air pollutants: ozone, PM, UFP, PAHs



# BTEX

- ◎ Captured during extraction of crude oil and raw natural gas
- ◎ Uses
  - > Gasoline additives
  - > Industrial and household products

# Sources of BTEX in the air

- ⦿ Tailpipe emissions
- ⦿ Gas pump emissions
- ⦿ Fossil fuel extraction
- ⦿ Household products
- ⦿ Cigarette smoke

# BTEX effects

- ◎ From high/occupational exposures
  - > Carcinogenic
  - > Respiratory, immune, cardiovascular effects
  - > Affect development and reproduction
  - > Severe damage to the nervous system, death

# Endocrine Disruption

- Endocrine disruption and low dose exposure
- Permanent effects from prenatal and early childhood exposures
- Prior studies show endocrine effects of BTEX at high exposure levels

# Evidence of BTEX exposure

- ◉ Detected in the air:
  - > More than 90% of the time
  - > Usually at very low concentrations
- ◉ Detected in our bodies
  - > Found in blood, urine and umbilical cord blood

# Evidence for effects from low level exposure

- ⦿ Animal studies of health effects = 0
- ⦿ Human studies = ?
  - > No existing review of research in humans



# Objectives of the review

- Identify all the non-cancer studies in humans at ambient exposure levels
- Summarize the findings, draw conclusions, and identify research gaps

# Overview of studies reviewed

- Identified a total of 42 studies
  - > 35 benzene
  - > 17 toluene
  - > 12 ethylbenzene
  - > 16 xylene



# Exposure

- Measurements taken

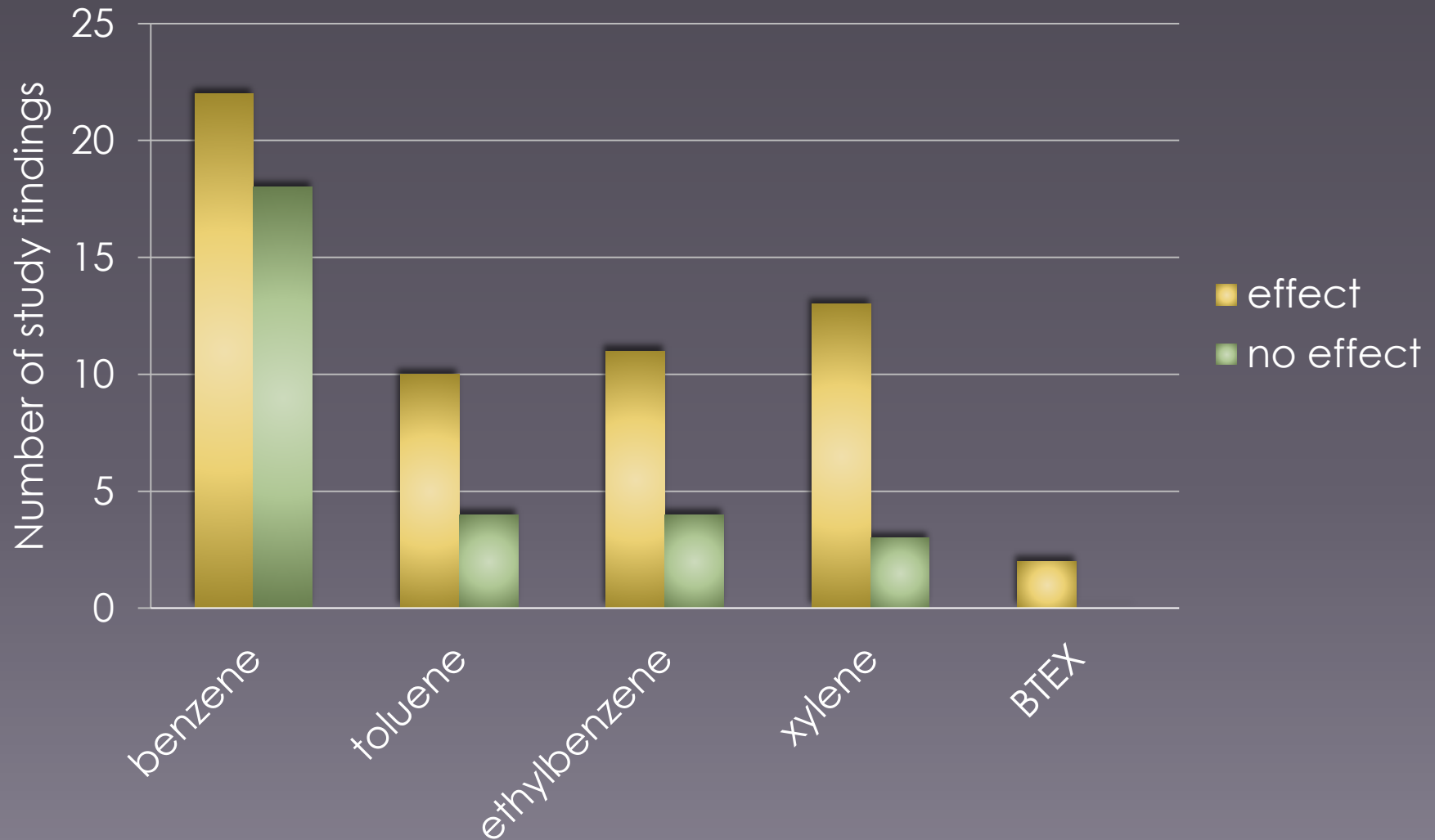
- > In personal air
- > Indoors
- > Outdoors
- > In blood/urine

- Exposure timing

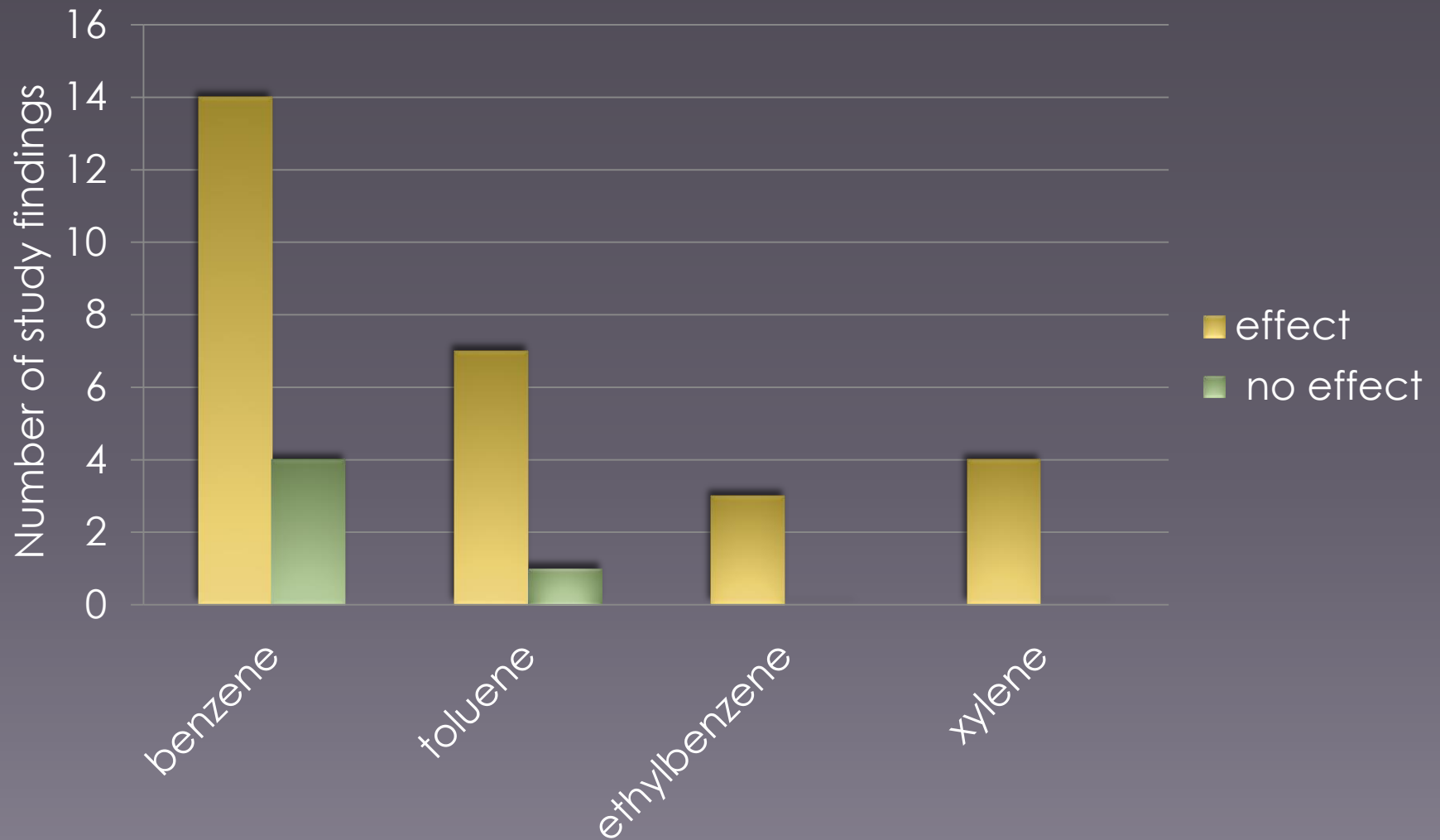
- > Prenatal/Childhood/Adolescence (32 studies)
- > Adulthood/Elderly (12 studies)



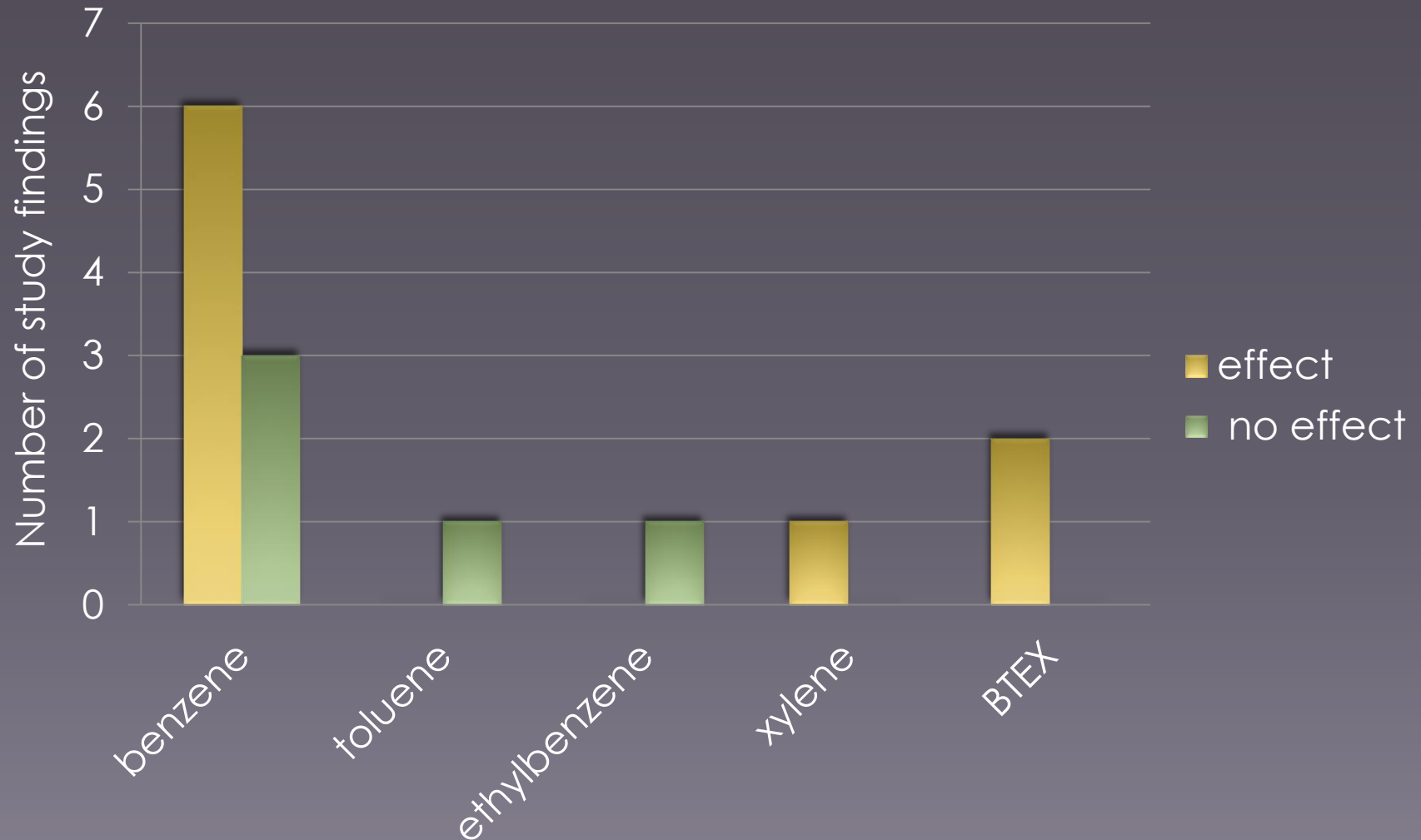
# Respiratory



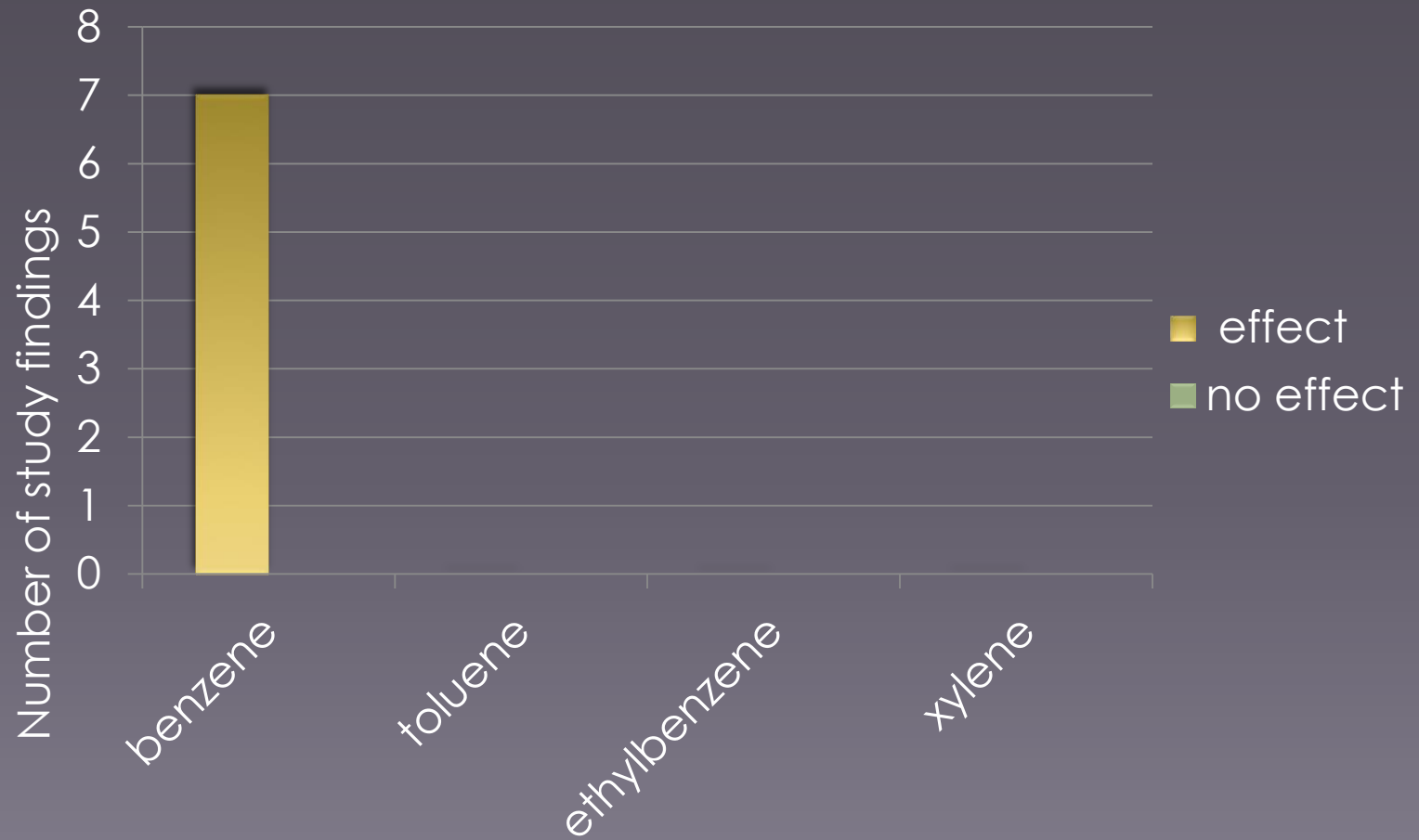
# Immune



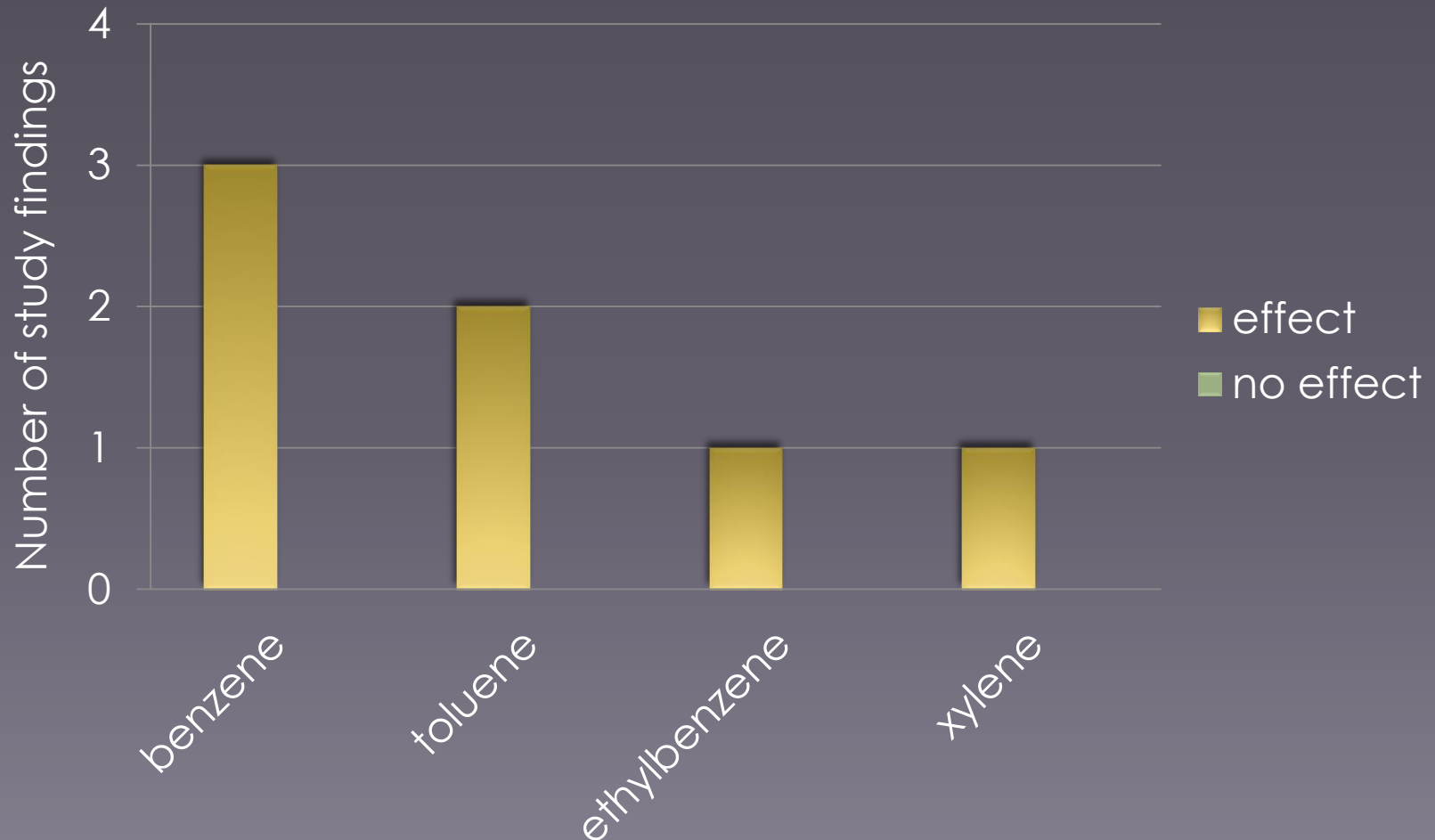
# Developmental



# Reproductive

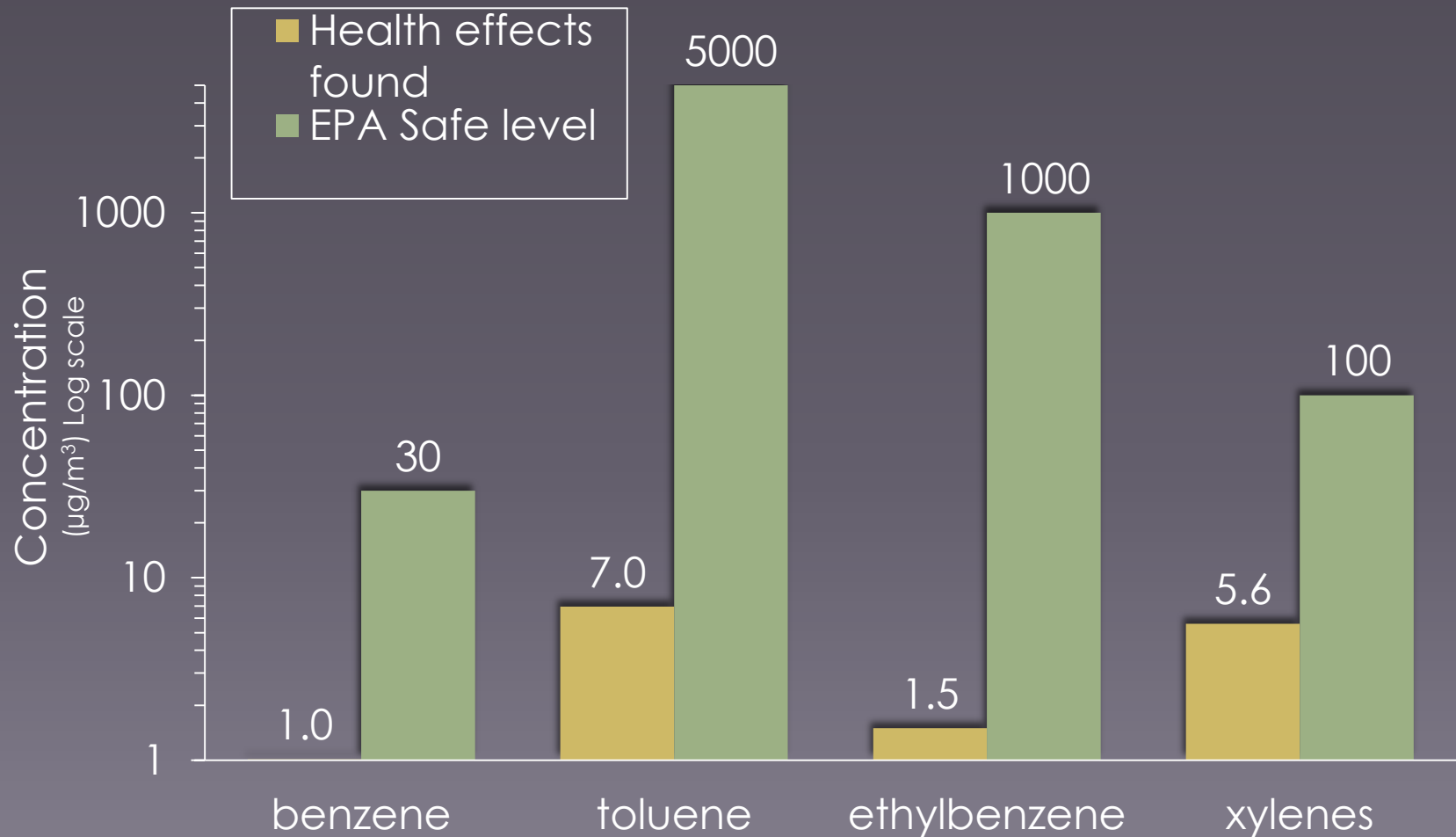


# Cardiovascular and blood





# Are EPA safe levels really safe?



# Conclusions

- BTEX can have significant health impacts in the general population
- Children are at risk through prenatal and early childhood exposure
- EPA standards may not be protective of public health



# Recommendations

- ◎ BTEX should be removed or limited in consumer and industrial products, including transportation fuels
- ◎ They should be replaced with chemicals that do not have biological activity



TEDX

The Endocrine  
Disruption  
Exchange

Thanks to my co-authors Ashley Bolden  
and Theo Colborn, and the TEDX staff

Our funders: Winslow Foundation, Arkansas  
Community Foundation, and Wallace Genetic  
Foundation

And the Environmental and Energy Study Institute

[www.tedx.org](http://www.tedx.org)