Identifying EDCs for Public Health Protection: The Endocrine Perspective

R. Thomas Zoeller, University of Massachusetts Amherst
Introduction

Over 18,000 members – rapidly growing

122 Countries, 40% from outside US

World’s leading experts in Hormone Research
EDCs are a global health threat

Diabetes
Metabolic
Neurobehavioral
Reproduction

Immune deficiencies
Birth Defects
IQ loss
Cancers
Hormones:

- Act on receptors
- Control development
- Act at low concentrations
Critical features of hormone action

1. Outcome – population and individual level
   Adverse = risk factors for chronic disease
3. Permanence – effects are irreversible.
Thyroid Hormone and brain development:

Synthetic chemicals can interfere with thyroid hormone action in the developing brain without changing hormone levels in the blood.
Visual processing

Visual attention

Gross Motor Skills

Executive processing

Memory

Visuospatial skills

Language

Auditory processing

Callosal Projections

Gene expression

RC 3, NSP-A, Oct-1

Neuronal migration

Cortial lamination

Open field activity

Brain Development

Thyroid Hormone

FIRST TRIMESTER

SECOND TRIMESTER

THIRD TRIMESTER

POSTNATAL

G1-G17

G17-G21

POSTNATAL

Zoeller & Rovet, 2004
Conclusions

- Thyroid hormone is important.
- But, no mammalian endpoints of TH action in current screens/tests
- No compensation
Thyroid is but one hormone system

- Gonad
- Adrenal
- Kidney
- Pancreas
- Muscle
- Gut
- Brain
- Heart
Endocrine Society favors “Option 3”

OPTION ONE

Obsolete criteria
Criteria **must** derive from contemporary understanding of the endocrine system.
Endocrine Society favors “Option 3”
Endocrine Society favors “Option 3”

Several categories, 
most rational approach
Endocrine Society does not agree with “Option 4”

- Option One
- Option Two
- Option Three
- Option Four

Using potency cut off as a predominant factor would be a mistake.
Why “Potency” as a cut-off is a Mistake


Endocrine Society favors “Option 3”

Using potency cut off as a predominant factor would be a mistake
This is serious

- Current approach does not capture all EDCs
- Endocrine Perspective is critical
  - Specific endpoints
  - Low dose
  - No threshold
  - Adversity = risk factors
  - Use of the open literature
  - Estimated costs of endocrine-disrupting chemical exposure exceed €150 Billion annually in EU