Complexity within blades of the “fan”
FACT

• None of you would be in this room today if you had had low thyroid hormone during fetal and neonatal development.
FACT

• You would not have had your careers
FACT

• You would not have contributed new knowledge in your respective fields
FACT

• You would not have trained your students and postdocs
FACT

• They would not have developed as they have
FACT

• Your scientific world would be different
FACT
FACT

• Chemical exposures today are causing neurobehavioral problems including cognitive deficits.
FACT

• An important mechanism by which chemicals cause cognitive deficits is by disrupting thyroid hormone.
Because thyroid hormone is essential for normal brain development

- All babies born in the developed world have blood levels of thyroid hormone measured to detect the developmental disorder of “Congenital Hypothyroidism” (idiopathic CH)
  - 1 in 1200 births to 1 in 3500 births depending on location
FACT

• The average IQ of CH infants before screening was 76.

• The % of CH infants with an IQ above 85 was:
  – 78% if the diagnosis (and treatment) was made within 3 months
  – 19% when it was made between 3-6 mos
  – 0% when made after 7 mos
Individuals with an IQ score between 50-70 are classified as moderately retarded.

Individuals with an IQ score between 125-144 are classified as gifted or highly gifted.

- Normal Distribution
- Shift in Average of 5 IQ points
- Shift in Average of 10 IQ points
Clinical studies including those of CH show that serum thyroid hormone level is important for brain development.

BUT, mechanistic studies and observations of genetic defects in humans show that tissues can regulate “delivery” of thyroid hormone independent of blood levels of thyroid hormones.
How is this related to EDCs and “toxification”

- Polychlorinated Biphenyls
- Polybrominated Diphenyl Ethers
- Triclosan & Triclocarbane
- Thyroxine (T₄)
- Bisphenol A
What our lab has shown

- Some chemicals can act “Like” thyroid hormone and some can block it.
- Some chemicals can do this NOT by changing blood levels of thyroid hormone, but by acting at the tissue levels.
Conclusions for PCBs

- Two-Step mechanism
  - Proof in cell culture
  - Strong evidence in animals
  - Evidence in human (term placenta) that is fully consistent

- There are chemicals to which we are all exposed that can interfere with thyroid hormone in a manner that “escapes” detection by the world-wide system of safety determination.

Mean of 115 chemicals per cord blood sample
Is the fetus/neonate contaminated?

- Babies born today have well over 100 manufactured chemicals. They are born “pre-polluted”.

Mean of 115 chemicals per cord blood sample
Thyroid hormone action can be disrupted at several points of regulation by different kinds of chemicals. There is no information on these mixtures.

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