

***In utero* Exposure to Endocrine Disrupters and Dietary Phytoestrogens**

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Endocrine Disruption Hypothesis:

- **Exogenous chemicals (man-made and naturally occurring) are capable of altering endocrine physiology;**
- **Multiple organ systems (endocrine, reproductive, nervous and immune) are affected by endocrine active compounds (EACs) ;**
- **Even very low concentrations pose a risk; and**
- **Developing organisms are more sensitive to the effects of EACs than are adults.**

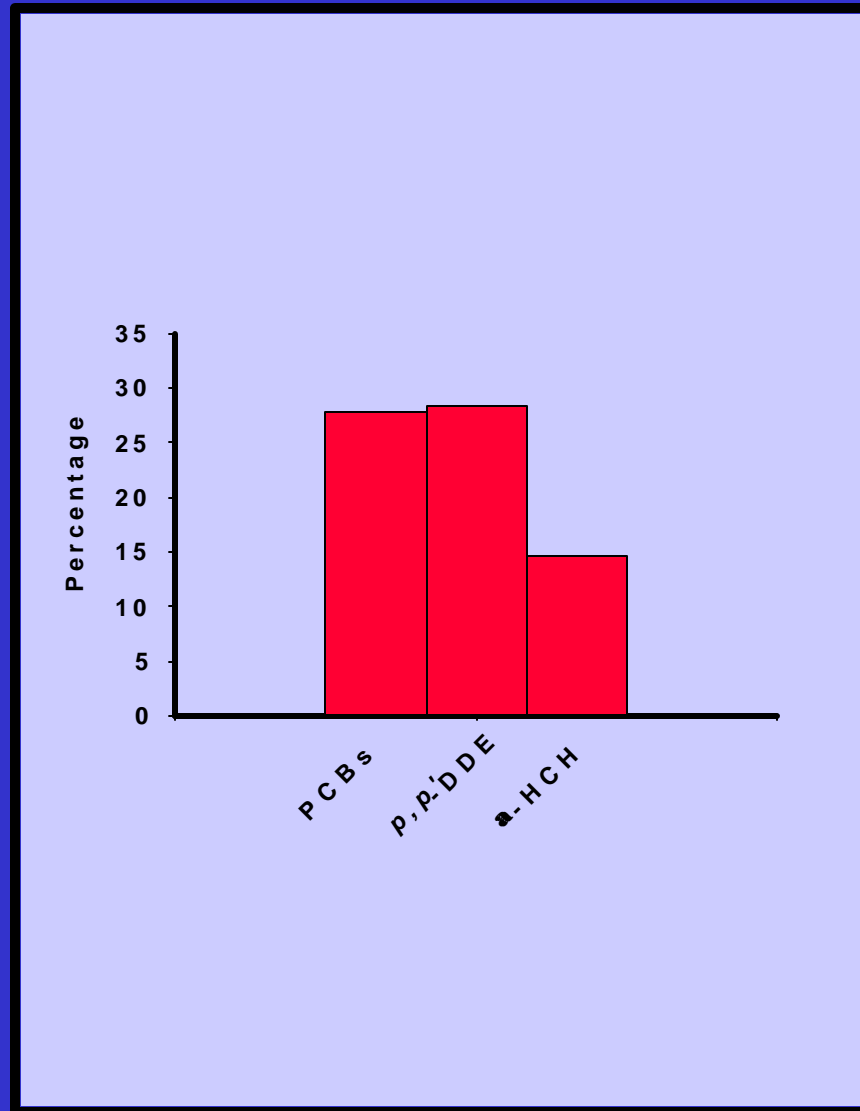
Weaknesses of the Data:

- **Sample size limitations;**
- **Regional influences;**
- **Changing patterns of medical practice;**
- **Statistical methods employed; and**
- **Weak or absent exposure assessments.**
 - **no direct measurements;**
 - **surrogate measures; and**
 - **temporal disconnection from effect.**

Approach: (Pilot study)

- **Routine amniocentesis (16 - 20 weeks of gestation);**
- **Group A - 51 women, samples tested for organochlorines;**
- **Group B - 53 women, samples examined for phytoestrogens (genistein, daidzein, formononetin, and biochanin A).**
- **Residue levels determined by gas chromatography/mass spectrometry.**

Detection levels - organochlorines:



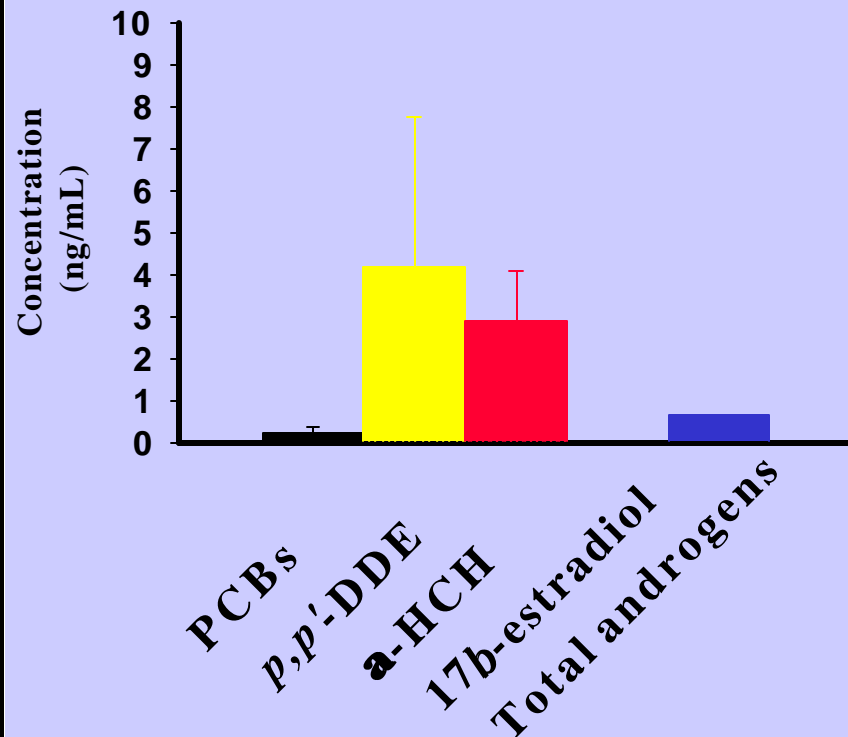
Mean (SEM) Patient Characteristics: Group A

	All women	Women with positive results
Maternal age (yr)	36.5 ± 0.5	36.4 ± 0.7
Age range (yr)	28 - 42	32 - 41
Gestation age (weeks plus days)	17.7 ± 0.2 3.1 ± 0.3	17.8 ± 0.3 3.4 ± 0.6
Nulliparous	12 (23.6%)	2 (18.2%)
Multiparous	31 (60.9%)	8 (72.8%)
Fetal sex (male vs. female)	22 & 29	4 & 8

Results:

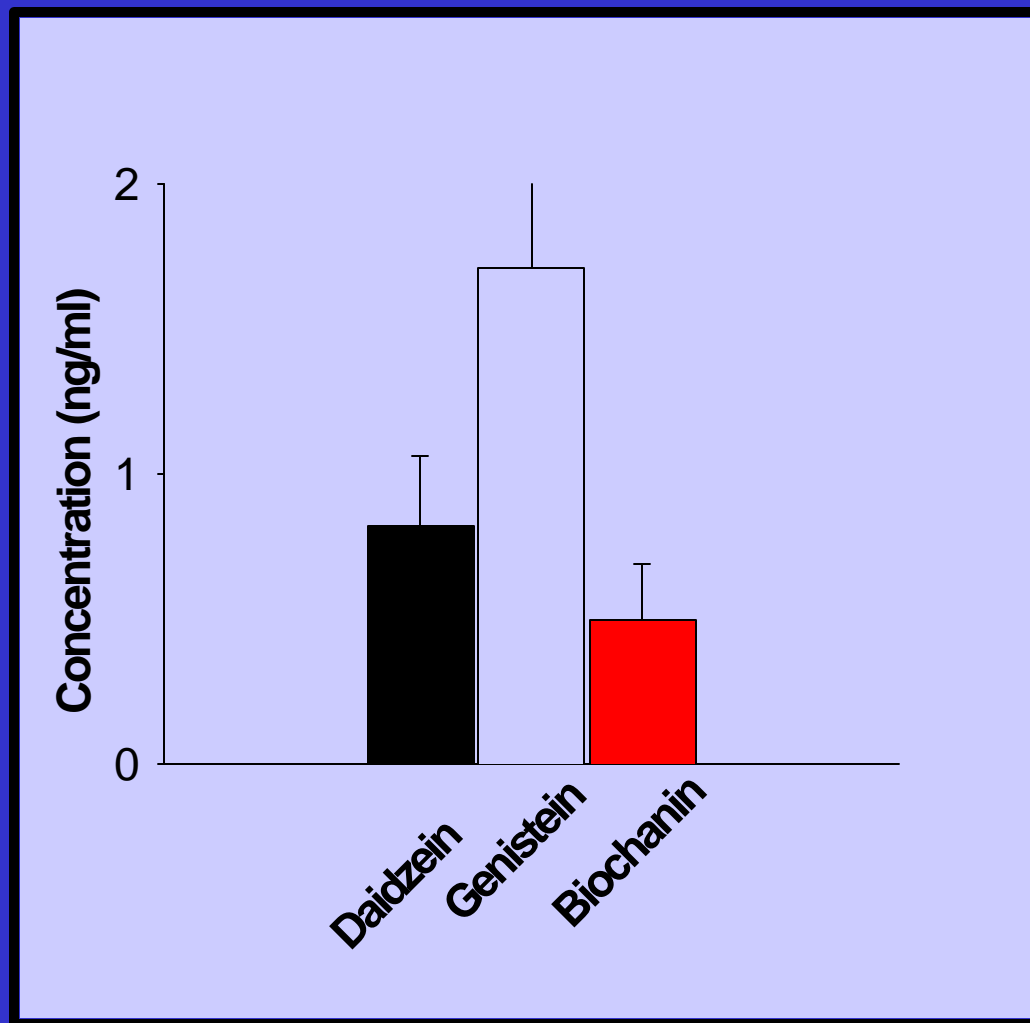
- Mean (SEM) lipid adjusted levels of contaminants found in the amniotic fluid (n = 54).
- Amniotic fluid levels of estradiol in male fetuses and total androgens in female fetuses at approximately equivalent gestational ages (Robinson et al., J. Clin. Endocrinol. Metab. 45:755-761, 1977).

Mean (SEM) level of organochlorine contaminants in amniotic fluid (n=54) and endogenous gonadal steroid levels for comparison.



Phytoestrogens:

- Mean levels of the phytoestrogens found in the amniotic fluid (n = 53).
- Formononetin was not detected in any of the samples tested.



Conclusions:

- Amniotic fluid is a relevant tissue compartment for assessment of fetal exposure to EACs.
- The percentage of positive samples for EACs indicates that, at a minimum, 30% of fetuses in LA have some degree of exposure to EACs.
- Although we did not test for adverse health effects, the concentrations of EACs measured are sufficient to be a cause for concern.