

Persistent environmental toxicants in human breast milk and infant growth

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Toxicants and metabolic outcomes

- Toxicants are passed to infants via breastmilk
- Perinatal toxicant exposure alters growth patterns and later obesity outcomes (Iszatt 2016, Iszatt 2015, Vafeiadi 2015, Valvi 2014, Mendez 2011, Tang-Peronard 2011, Verhulst 2009)
- Most studies look at levels in maternal pregnancy serum or cord blood



Objective

- Explore levels of 26 toxicants in **human breast milk** and their association with rapid infant growth



Study design: HUMIS-NoMic Study

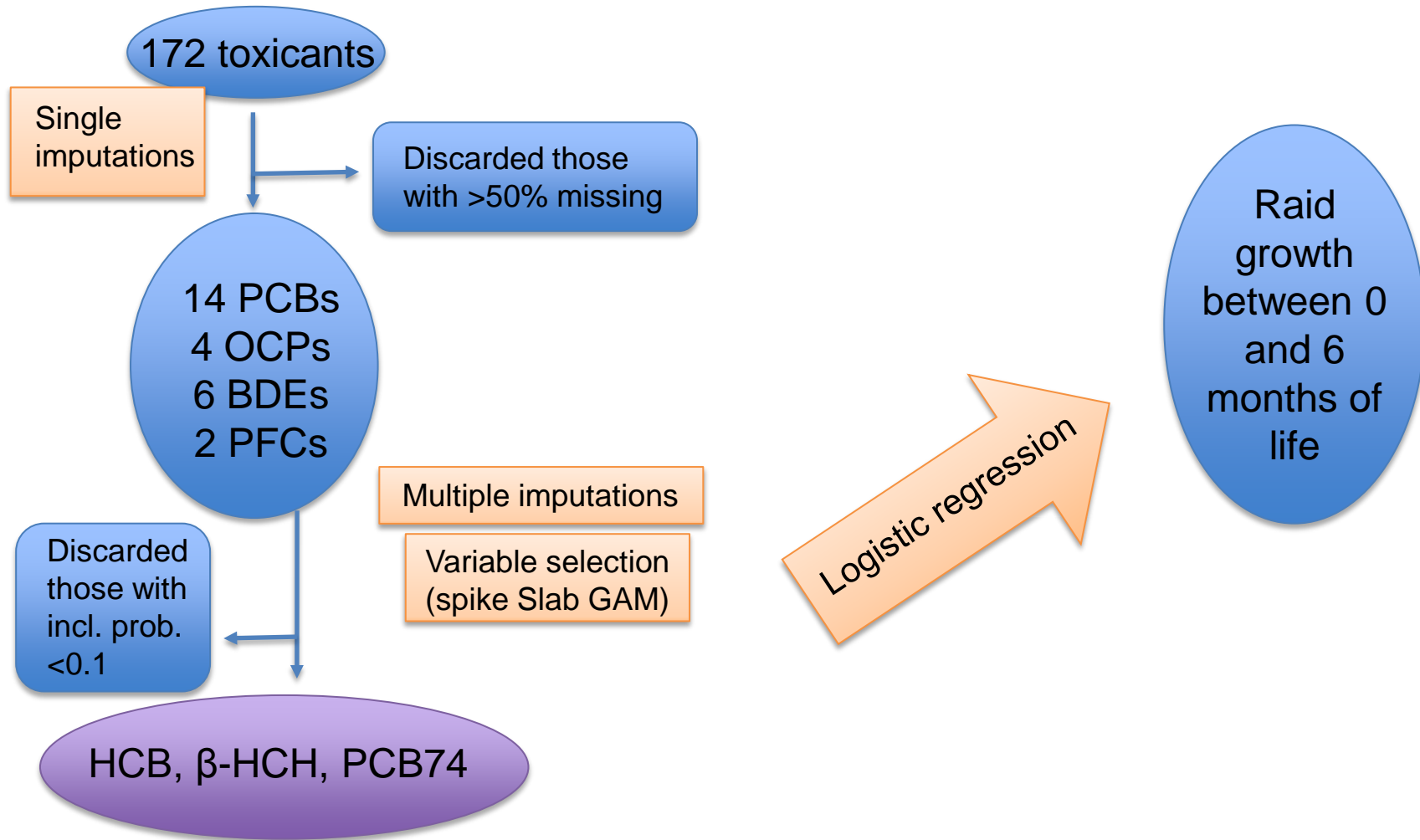
- Prospective cohort of 2,606
- Enrolled 2 weeks postpartum between 2002-2008
- Questionnaires completed on child's weight and length, pregnancy information, mothers' health status
 - Linked to Norwegian Medical Birth Registry
- 2400 have milk samples
 - Toxicants analyzed in 1300
 - Milk lipids analyzed in 800
- Also have collected data on gut microbiota, metabolomics, diet, neuropsychological outcomes, immune outcomes



Characteristics

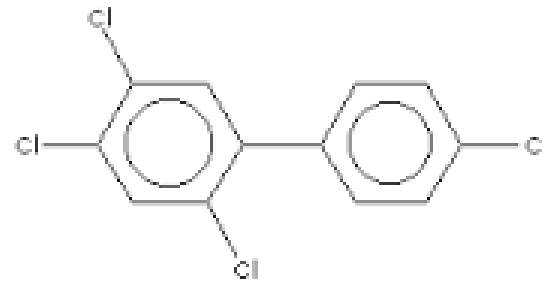
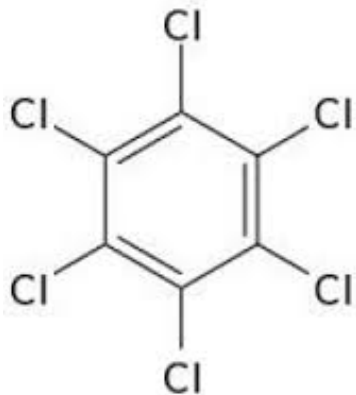
- 800 milk samples analyzed
 - Obese women oversampled
- Excluded duplicates and twins
 - > 789 singleton infants
- 19.2% rapid growers
- Mean maternal age 29.6 years
- Median pre-pregnancy BMI 24.0
- 45.3% of mothers were overweight or obese
- Rapid growers more likely to be first-born

Exposures and outcomes

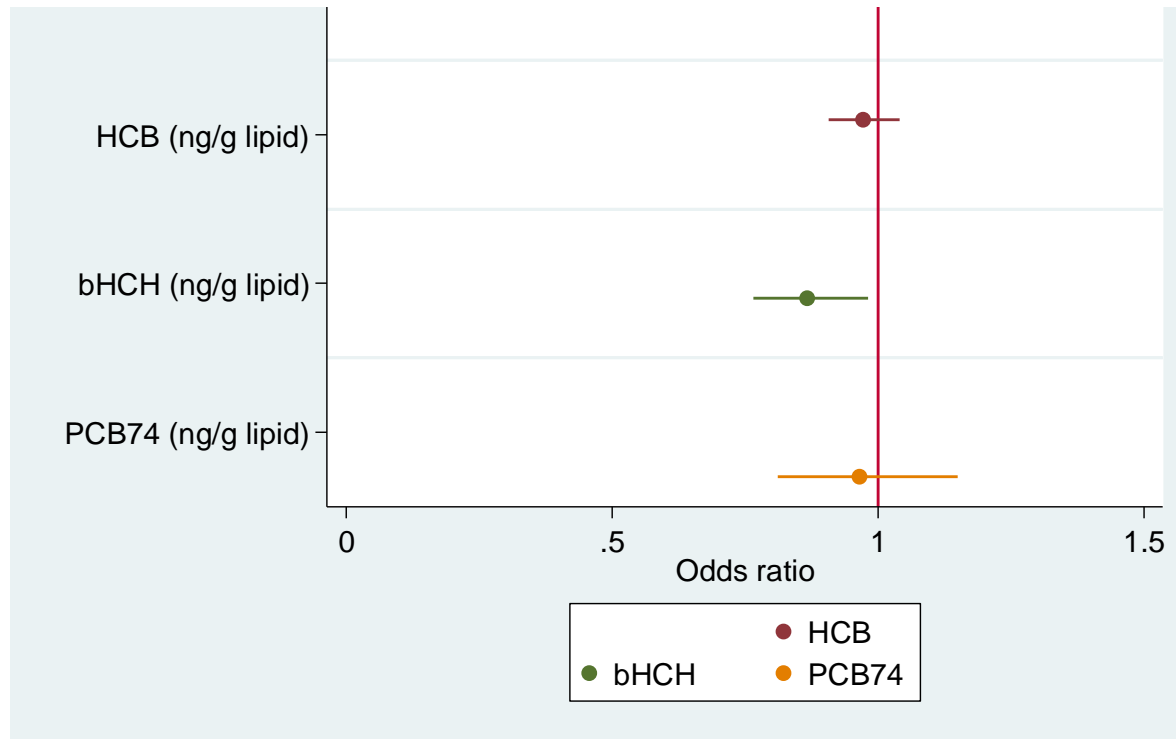


Final exposures: Persistent organic pollutants (POPs)

- Now largely banned, but previously widely used for pest control, industrial uses
- Accumulate and biomagnify in food chain
- Highly lipophilic
- Endocrine-disruptors

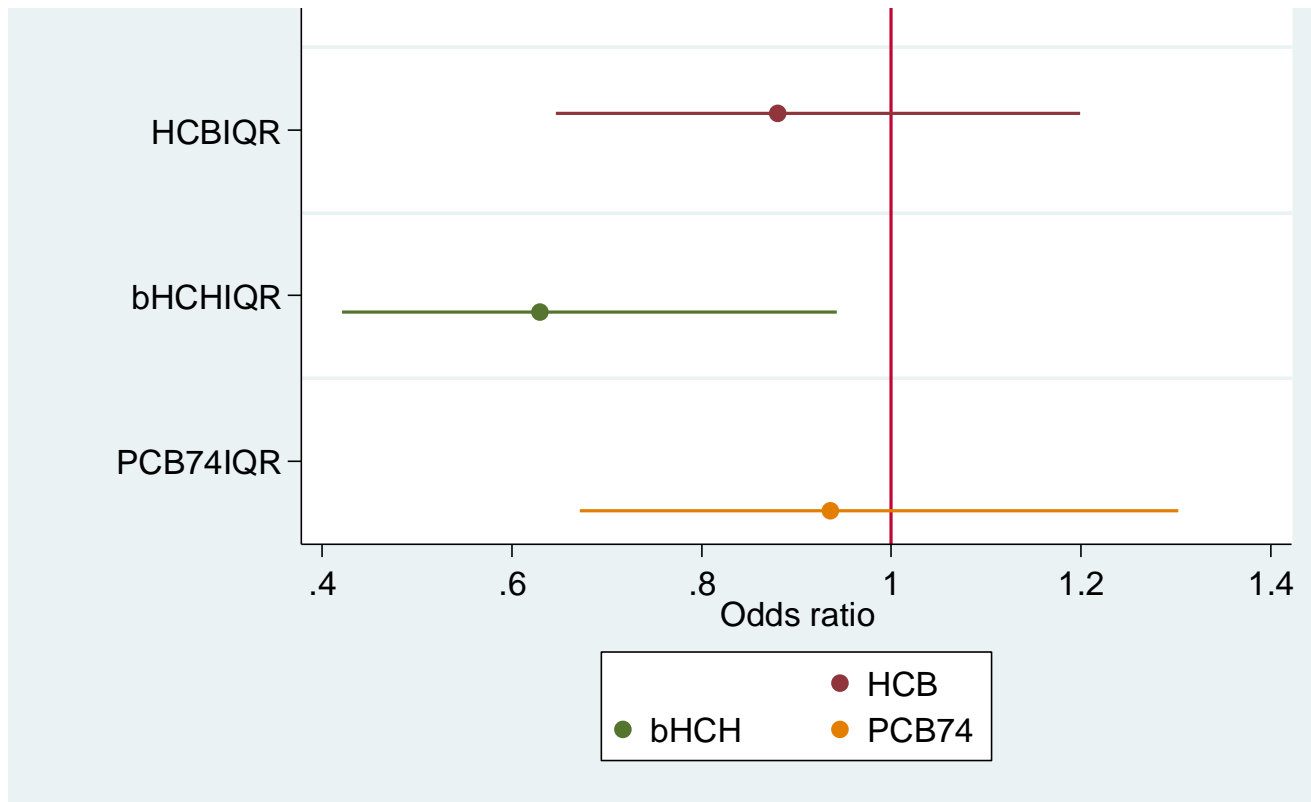


Results: Logistic regression



- Adjusted for maternal smoking, parity, sex, cumulative breastfeeding, education, pre-pregnancy BMI, maternal age, gestational weight gain, birth weight, gestational age, preterm status

IQR-adjusted results



- Adjusted for maternal smoking, parity, sex, cumulative breastfeeding, education, pre-pregnancy BMI, maternal age, gestational weight gain, birth weight, gestational age, preterm status

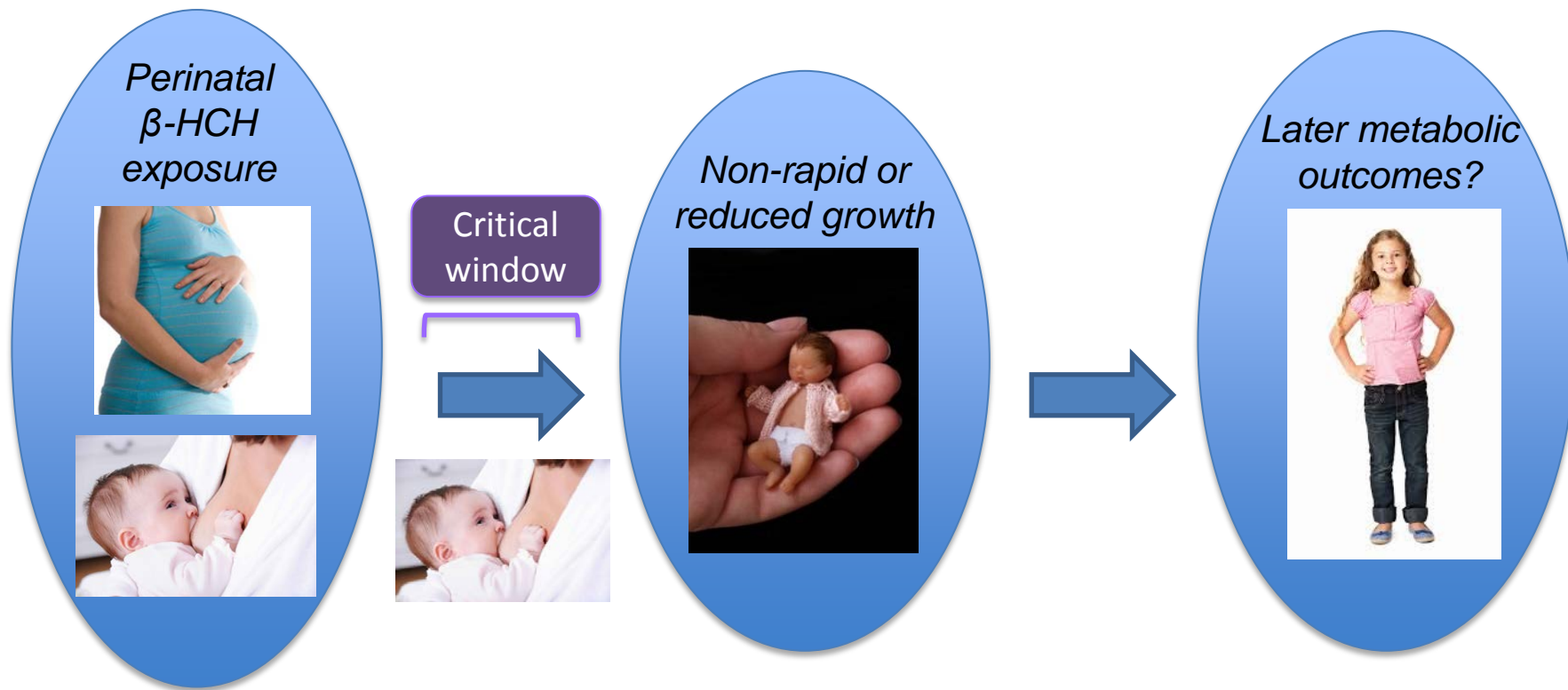
β -HCH and growth outcomes

- Previous studies on β -HCH and growth outcomes have been equivocal
 - Prenatal exposure linked to increased BMI z-scores and risk of overweight at 7 years (Agay-Shay 2015)
 - Others have found no association with growth outcomes (Cupul-Uicab 2013, Mendez 2011, Eggesbø 2009)
- In adults, serum β -HCH linked to increased BMI, insulin resistance, diabetes (Arrebola 2014, Dirinck 2011, Everett 2010)

POPs and programming

- HCB and PCBs in breast milk associated with lower birth weight, restricted fetal and infant growth (Iszatt 2015, Stigum 2015, Govarts 2012, Eggesbø 2009)
- Perinatal exposure to endocrine-disrupting chemicals leads to physiologic changes that predispose to obesity (Vafeiadi 2015, Tang-Peronard 2011)

β -HCH and programming



Conclusions

- β -HCH exposure via breast milk are associated with reduced odds of rapid growth in infancy
- May be related to decreased infant growth
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Thank you!
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