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Center for Integrative Research on
Childhood Leukemia
and the Environment

Environmental Risk Factors of Childhood Leukemia

CHE Partnership Call – Jan 22, 2014

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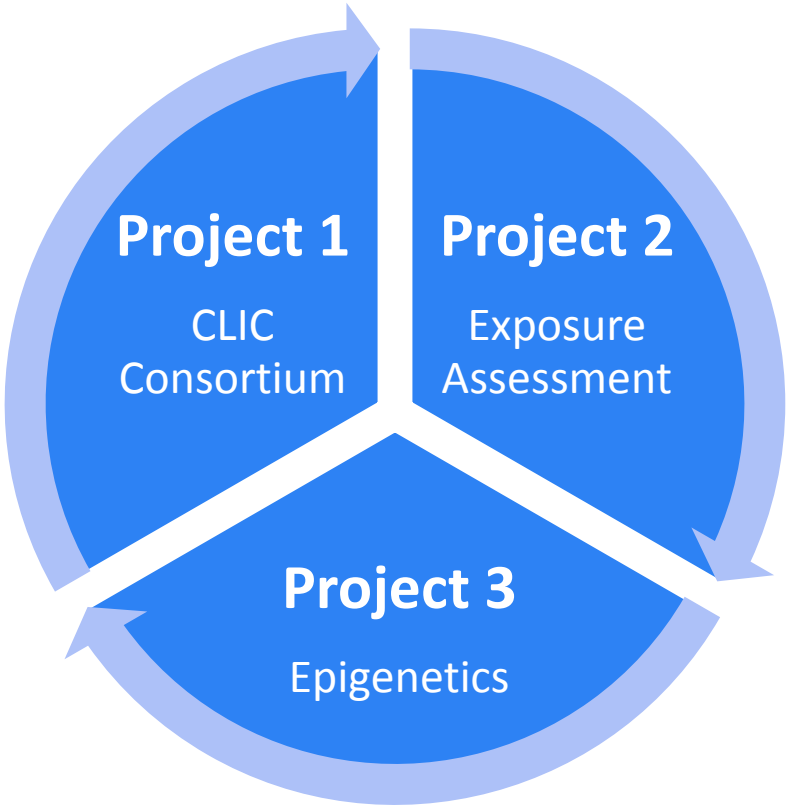
CIRCLE - Objectives

To examine the effects of
→ *in utero* and early life exposure to chemicals present in homes--**pesticides, tobacco, PCBs, and PBDEs**
→genetic & epigenetic factors, and their interplay in the development of childhood leukemia (CL).



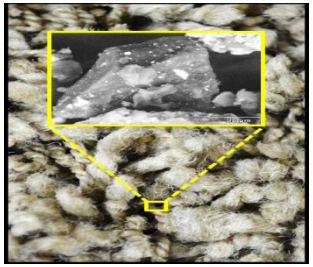
- Self-reports
- GIS studies
- Home dust samples
- Biomarkers of exposures

Highlights

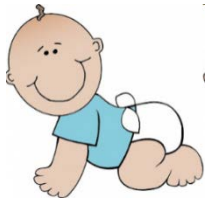
- Parental tobacco smoking

- Parental occupational exposure to pesticides

- Residential exposure to flame retardants



Critical Windows of Exposures to Tobacco Smoking



Effect on…	Parents' germ cells	Fetus' somatic cells	child's somatic cells
From…	Active smoking (second hand smoke)	Active smoking (second hand smoke)	Second hand smoke (third hand smoke?)

NIEHS

Childhood ALL

Exposure to tobacco smoking	Controls N = 975	Cases N = 767	OR[a] (95% CI)
Multivariable model			
Maternal prenatal smoking[b]			
No	856	661	1.00 (—)
Yes	118	106	0.83 (0.56–1.24)
Paternal prenatal smoking[b]			
No	703	498	1.00 (—)
Yes	222	218	1.17 (0.91–1.50)
Child's passive smoking at home[c]			
No	798	599	1.00 (—)
Yes	163	161	1.20 (0.84–1.72)
Joint effect of maternal prenatal smoking and child's passive smoking[d]			
No exposure during both periods	777	588	1.00 (—)
Maternal prenatal smoking only	21	11	0.60 (0.27–1.35)
Child's passive smoking only	67	67	1.11 (0.75–1.65)
Exposure during both periods	96	94	1.04 (0.74–1.47)
P-value for interaction			0.35
Joint effect of paternal prenatal smoking and child's passive smoking[d]			
No exposure during both periods	670	498	1.00 (—)
Paternal prenatal smoking only	127	98	0.91 (0.68–1.22)
Child's passive smoking only	74	46	0.80 (0.51–1.09)
Exposure during both periods	88	115	1.50 (1.01–2.23)
P-value for interaction			0.02

Joint effect is subtype-specific
Seen for ALL with t(12;21)….
but not for those with extra chromosomes

Source: Metayer et al, Cancer Epidemiology, Biomarkers and Prevention, 2013

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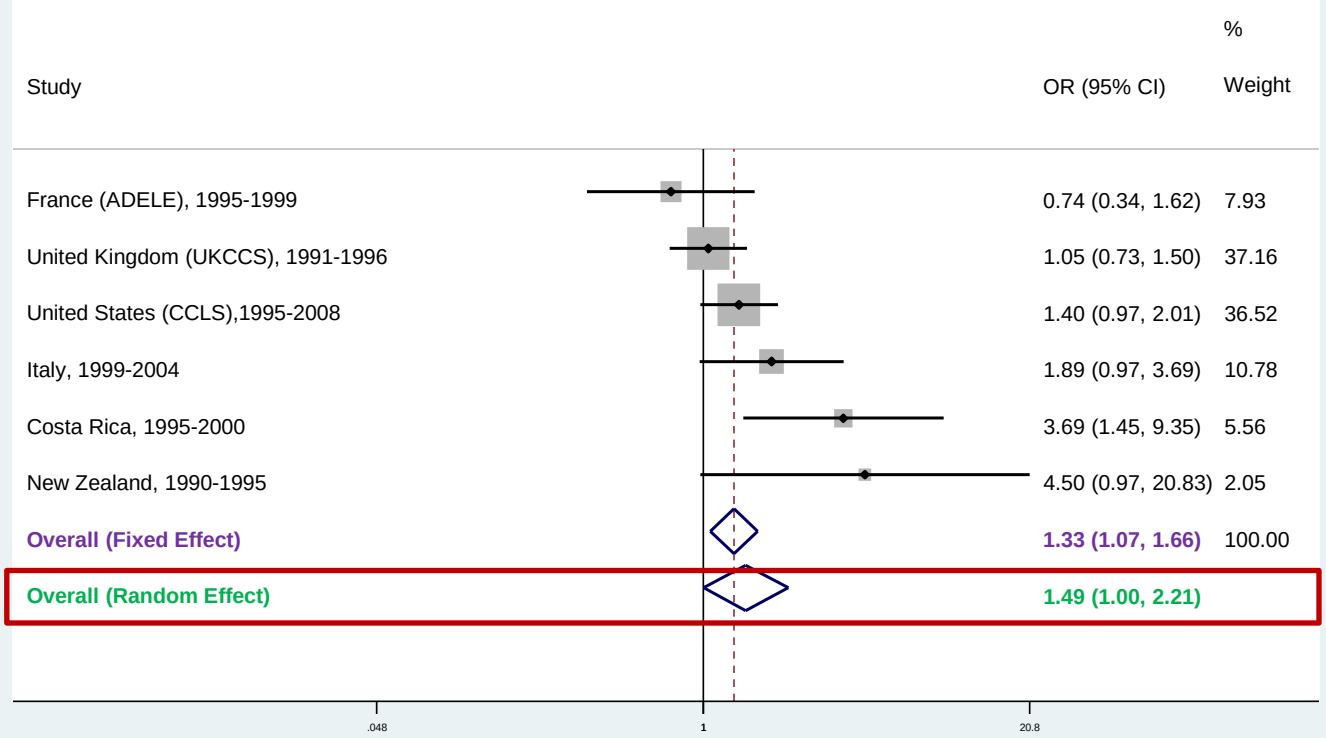
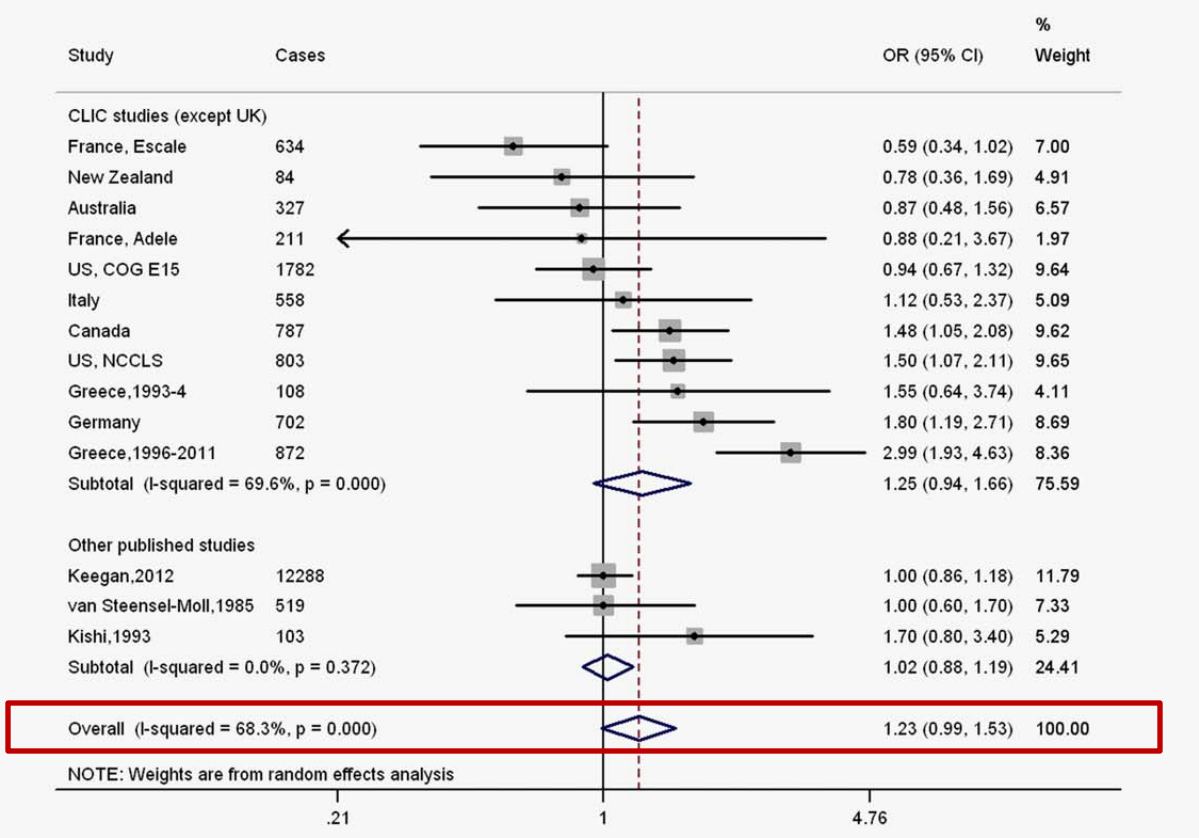
Childhood Leukemia International Consortium - CLIC

Paternal smoking and Childhood AML

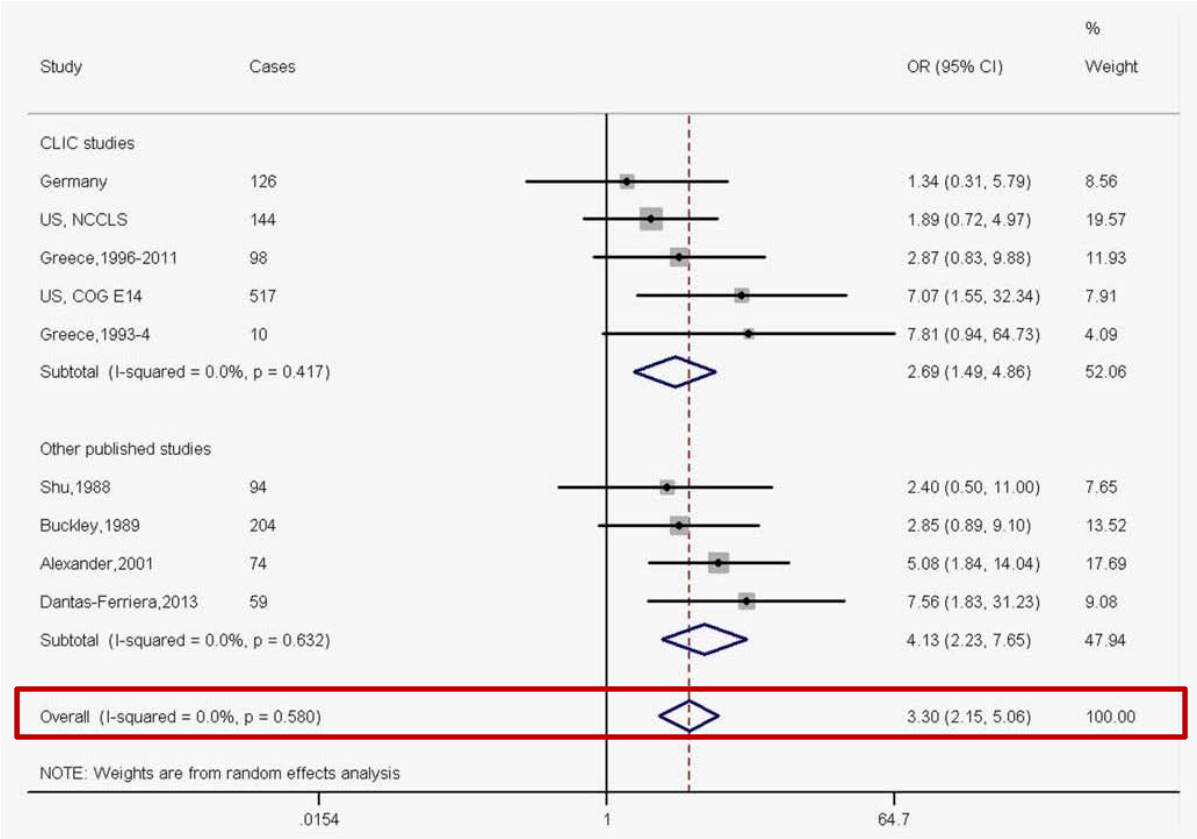


Paternal Occupational Exposures to Pesticides and Risk of Childhood ALL



Source: Bailey et al, IJE, 2014

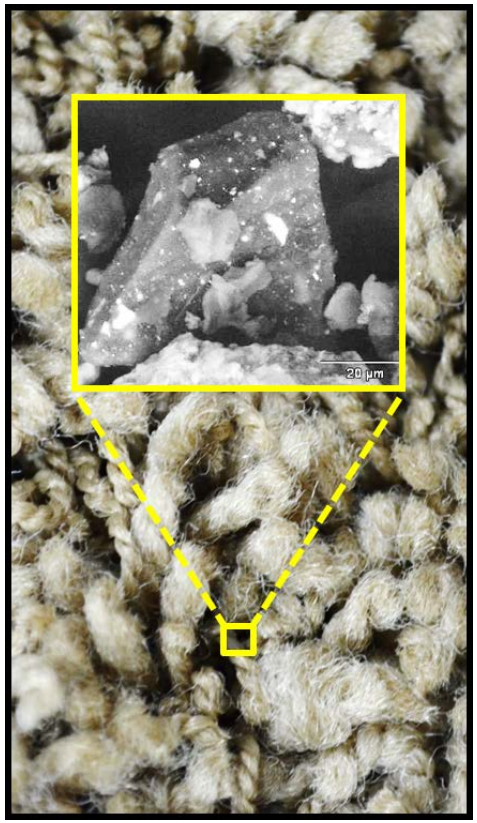
Maternal Occupational Exposures to Pesticides and Risk of Childhood AML



Source: Bailey et al, IJE, 2014

Exposure to PBDE (flame retardants)

- Risk of childhood ALL is associated with levels of specific PBDEs in dust
- Exposure determinants included, furniture with crumbling foam:
  - ↑ PBDEs in house dust
  - ↑ PBDEs in case blood
  - ↑ PBDEs in maternal serum
- PBDEs transferred from furniture to dust by volatilization and weathering/abrasion



Microscopic image of BDE-209 on dust from a CIRCLE home.

Source: Wagner et al. *Environ Int, 2013*

Thank you

- **Collaborators**: Catherine Metayer, Louping Zhang, Steve Rappaport, Todd Whitehead, Amy Kyle (UC Berkeley); Joe Wiemels and Mark Miller (UCSF); Gary Dahl (Stanford)
- **Participating families and hospitals**
- **CLIC members**
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SELECTED PUBLICATIONS

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- **B**ailey H, Fritschi L, Infante-Rivard C, et al. 2014 (Dec). Parental occupational pesticide exposure and the risk of childhood leukemia in the offspring: findings from the Childhood Leukemia International Consortium. *International Journal of Cancer.* 135(9):2157-72