Context: The French NEHAP

- The French National Environment and Health Action Plan (NEHAP) was adopted for the period 2004-2008.
- One of the priority actions is to conduct an epidemiological study on a cohort of children.

Main Objectives

- Describe childhood contamination during growth in environment neurotoxic and neoplastic substances.
- Explores the effects of contamination levels on neurocognitive development and child reproduction functions.
- Pesticides toxicity: Describe pesticide contamination in children (high values prevalence, concentrations distribution).
- Explore the consequences of contamination levels of pesticides on neurocognitive development and development of reproduction functions.
- Lead exposure during pregnancy (concentrations: prenatally, small birth weight, gestational age, redistribution, birth weight, neurodevelopment and development of reproduction functions).
- Characterization of child exposure to emerging pollutants (phthalates, ...
- Risk factors analysis.
- Air pollution and adverse pregnancy outcomes:— Description of air pollution during pregnancy in France.
- Explore the consequences of this exposure on birth defects and intrauterine growth.

Methods

1. Long-term follow-up of a nationally representative cohort of 20,000 children born in 2009 (French births during a one-week period four times in the year).

2. Early Data Collection in Maternity

- Day 1: Biological sampling Cord Blood.
- Day 2-4: Perinatal National survey:— Face-to-face questionnaires (administered by midwife) and data from medical file. Data collected on pregnancy, perinatal period, health status of women and children at birth.
- Day 4-10 (After face-to-face questionnaire):— Signatures of consent from mother and father, Biological sampling: mother’s urine, mother’s hair and milk;— Self administered questionnaire (nutrition + environment).

3. Biological sampler’s organization from maternities to Biobank

- Sampling by maternity’s midwife:— Sampling at birth (21 mL) directly after birth. Sampling of mother’s urine (150 mL) and mother’s hair (50 mL single hairs) during centrifugation and aliquotization.
- A part of sampling will be analyzed according to research objectives. The other part will be stored in Biobank.
- Its maximality, sampling will be stored at -4°C.
- Each day, biological sampler will be transported to a Regional Reference Center for centrifugation and aliquotization.
- Then, biological sampler will be transported and stocked in Biobank.

4. 6-8 Weeks Survey at Home

- Face-to-face questionnaires (Insee provider).
- Setting up random sampling and study sampling at child home for a 3 month period.
- Data collection: mother’s hair collection (100 mL) only on a subsample.
- Samplers and mother’s milk will be returned in stamped envelopes to reference laboratories.

Biological Analyses

- Mother’s urine analyses:— Corticoids, Phthalates, Alkylphenols, Organochlorine Pesticides, Organophosphorous Pesticides, Pyrethoids Pesticides, Organohalogen.
- Mother’s milk analyses:— POP (PBDE et PCB), POP (PFOS et PFOA), Phthalates, Cotinine.
- Cord blood analyses:— Nutrients, Environmental pollutants (lead, iron, zinc, selenium), Emergent pollutants (DIMS).
- Mother’s hair analyses:— Morvine.

Follow-up

- Environmental analyses
   - Dust samplers.
   - Air pollution models.
   - Geographical Information System (GIS).
   - Geographic coding of home and work addresses.
   - Description of active activities.
   - Time at home, Transport to work, Time at work.

- Biological analyses

Environmental analyses

• Reproductive development:— Medical file at birth (cleft upper urinary birth defects).
• Reproductive function (fertility and fecundity) by questionnaires.
• Neurobehavioral and cognitive development:— Neurobehavioral and cognitive evaluation during infancy.
• Questionnaires face to face.
• School records.

Analyses of effects

• Pesticides contamination:— Describe pesticide contamination in children (high values prevalence, concentrations distribution).
• Exploration of the consequences of contamination levels of pesticides on neurocognitive development and development of reproduction functions.
• Lead exposure during pregnancy:— Concentrations: prenatally, small birth weight, gestational age, redistribution, birth weight, neurodevelopment and development of reproduction functions.
• Characterization of child exposure to emerging pollutants:— (phthalates, ...).
• Risk factors analysis.
• Air pollution and adverse pregnancy outcomes:— Description of air pollution during pregnancy in France.
• Exploration of the consequences of this exposure on birth defects and intrauterine growth.

Time Table

• April-June 2007:— Maternity survey in 2 French districts, 5-6 weeks questionnaires at home.
• October-December 2007:— Maternity survey in 2 other French districts, Biological sampling cord blood: mother’s urine, mother’s hair, 5-6 weeks questionnaires at home.
• 2008:— Analysis of pilots and preparation for the launch of the cohort.
• 2009:— Emotions, maternity surveys, 4-6 weeks surveys.
• 2012:— Kindergarten Survey.
• 2015:— First Grade Survey.

Partnership

JPI

IRED

InVS

Inserm

Insee

Depp

DGS

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