Human Biomonitoring in Spain

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Existing Activities:
- Research studies
- Regional/local programs

Selected Examples:
- INMA (Network of Excellence funded I.S. Carlos III)
- BIOMADRID (Regional government, community of Madrid)
- Nutritional Survey of Canary Islands (Regional government)

Ongoing/planned Activities:
- Spanish Ministry of Environment and Institute of Health
  Carlos III (2007-2010)
  Research and Biomonitoring POPs and other pollutants in the Spanish population (BOE nº192, 11-08-2007).
INMA, Childhood and Environment

- Describe prenatal and early life exposure to air and water pollutants, and the internal dose of chemicals during pregnancy and at birth
- Evaluate the impact of the exposure to different contaminants on infants' growth, health and development
- Evaluate the role of diet and fatty acids on infants' growth, health and development

Cohorts:

<table>
<thead>
<tr>
<th>Population</th>
<th>Inclusion year</th>
<th>Target number</th>
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<td>Menorca</td>
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<td>Guipuzcoa</td>
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Chronogram:

<table>
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<tr>
<th>Year</th>
<th>Flix</th>
<th>Menorca</th>
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<th>Valencia</th>
<th>Sabadell</th>
<th>Asturias</th>
<th>Guipuzcoa</th>
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<td>2012</td>
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</table>
RESEARCH

INMA, Childhood and Environment

- PAHs, ozone, VOCs, NO\textsubscript{2} and particles
- Trihalomethanes
OCs/policromates, PBDEs and phthalates and
- Others endocrine disruptors
- Lead, arsenic and mercury
- Outdoor and indoor determinations
- Personal questionnaire
- Maternal nail, serum and milk
- Child serum, nail and hair
- Placenta
- Cord blood

Maternal occupation, diet, antioxidants, folate, fatty acids, vitamin D, genetic study
paternal psychoaffectivity
oxidative stress, intrauterine growth, sexual development, postnatal growth,
neurodevelopment, asthma/atopy, thyroid hormones
- Questionnaire
- Maternal milk, blood and urine
- Child serum
- Cord blood
- Ultrasound
- Physical examination and medical test and scales

REGIONAL STUDIES

BIOMADRID

- Descriptive study cross-sectional
- Start point: 2003
- Samples size:
  - 145 triplets, mother, father and baby
  - 74 Vallecas
  - 75 Getafe and Parla

- Representative of the population of Canary Archipelago
- From 6 to 75 years old for both genders.
- 700 serum samples
- Total cholesterol and triglycerides data, Dietary variables, sociodemographic factors, life habits and health condition.

GENERAL POPULATION: NO GROUPS AT RISK
Serum values of Total DDT body burden and p,p'-DDE in relation to age

<table>
<thead>
<tr>
<th>Age</th>
<th>Range</th>
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<tbody>
<tr>
<td>1</td>
<td>&lt;18 years</td>
</tr>
<tr>
<td>2</td>
<td>18-34 years</td>
</tr>
<tr>
<td>3</td>
<td>35-49 years</td>
</tr>
<tr>
<td>4</td>
<td>50-64 years</td>
</tr>
<tr>
<td>5</td>
<td>65-75 years</td>
</tr>
</tbody>
</table>

Serum concentrations (ng/g) - Median

Lipid adjusted serum values of p,p'-DDE (ng/g)

Median Canary Islands: 118
Median USA: 226

Ongoing Activities:

Research and Biomonitoring POPs and other pollutants in the spanish population (BOE nº192, 11-08-2007).
Budget : 1,500,000 € 2007-2010

Monitoring Environmental Chemicals:
Environmental and Human Biomonitoring

Human biomonitoring
Metals and persistent organic pollutants in human samples

Environmental monitoring
(atmosphere, water, soil and biota)

“The Stockholm Convention on POPs”


RESOLUCIÓN de 3 de agosto de 2007, de la Subsecretaría, por la que se publica el Decreto por el que se crean las bases reguladoras de la creación de la Subsecretaría de Medio Ambiente y Medio Rural y Marino, para la elaboración de la Estrategia Nacional de Medio Ambiente y el Instituto de Salud Carlos III, para la investigación sobre la generación y vigilancia de contaminantes orgánicos persistentes y otras sustancias en humanos.
Environmental Monitoring

Ongoing Activities:
Spanish Ministry of Environment (2007-2010)

CIEMAT, Public Research Agency for research in energy and environment
CSIC, Spanish National Research Council

Persistent Organic Pollutants and other Chemicals

- Organochlorine pesticides*
- Polycyclic aromatic hydrocarbons *(PAHs)
- Polychlorinated biphenyls *(PCBs)
- Polybrominated diphenyl ethers *(PBDEs)
- Cotinine
- Metals


Human Biomonitoring

- POPs:
  - Organochlorine pesticides*
  - Polycyclic aromatic hydrocarbons *(PAHs)
  - Polychlorinated biphenyls *(PCBs)
  - Polybrominated diphenyl ethers *(PBDEs)
- Cotinine
- Metals

Biological matrices
- Blood
- Urine
- Placenta
- Hair

PILOT STUDY


CHEMICALS
Methyl-mercury, Total mercury, Cotinine, Cadmium, ...

<table>
<thead>
<tr>
<th>HAIR</th>
<th>URINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total mercury</td>
<td>Cotinine, Total mercury, Cadmium, other metals</td>
</tr>
<tr>
<td>Methyl-mercury</td>
<td></td>
</tr>
</tbody>
</table>

SAMPLE
n= 280 adults, 20-56 years

PILOT STUDY

• Volunteer workers of ISCIII
• Annual medical examination
• Hair and urine samples
• Questionnaire (Age, gender, Tobacco exposure, resident area, housing, fish consumption, hair care and amalgam fillings)
### Preliminary Results for Mercury

<table>
<thead>
<tr>
<th></th>
<th>Total mercury (µg/g) (hair)</th>
<th>Methyl-mercury (µg/g) (hair)</th>
<th>Mercury (µg/L) (urine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometric mean (95% CI)</td>
<td>2.23 (2.06 – 2.40)</td>
<td>1.65 (1.52 – 1.79)</td>
<td>1.22 (1.11 – 1.35)</td>
</tr>
<tr>
<td>Minimum value</td>
<td>0.15</td>
<td>0.08</td>
<td>&lt;0.03</td>
</tr>
<tr>
<td>Maximum value</td>
<td>11.6</td>
<td>9.82</td>
<td>11.6</td>
</tr>
</tbody>
</table>

US EPA Reference dose 1.2 mg/kg hair

650,000 / year annual medical examinations (3,579,808 workers)
50+1 Spanish Provinces (17+ 1 Regions)

Selection Representative of Spanish Population (workers, $\delta$ y) according to The National Workers Statistics 2007
A.G.E: 16 – 65

EXCLUSION CRITERIA:
< 5 years living in Spain

SECTORS: Services, agrarian, industry and building-construction.

Representative of Spanish Population
National Work Statistics Ratio (workers, -)

SAMPLE: 1,800 workers,
AGE: 16 – 65

National Center Environmental Health
National Center Epidemiology

Sampling and analysis

SELECTED CENTRES
Annual medical examination

VOLUNTEER WORKERS

Environmental Toxicology laboratory

Blood, urine, hair and questionnaire

Medical history

BLOOD
- Metals
- Organochlorine pesticides
- Non-coplanar PCBs
- PBDEs

Urine
- Hydroxylated metabolites of PAHs
- Cd and other metals
- Cotinine

Hair
- Total mercury
- Methyl-mercury
Existing Activities: Capability to perform biomonitoring

Need to Policy-action to establish National activities on a regular basis

Coordination at European Level

Thanks!