



science and policy
for a healthy future

Pesticides and public health

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SDU 

HBM4EU - European Human Biomonitoring initiative

Consortium partners: 28 countries (24 member states, 3 associated countries, Switzerland) and the European Environment Agency

Aim to generate evidence of the actual exposure of citizens to chemicals across Europe and the possible health effects in order to support policy making

- Provide harmonised and reliable human biomonitoring data
- Assess the evidence for a causal link between chemicals and health impacts

18 chemical substances/substance groups prioritised by partner countries, EC Directorate-Generals and relevant EU agencies, including pesticides:

pyrethroids (as group), chlorpyrifos, fipronil, dimethoate, glyphosate
(including the co-formulant POE-tallow amine)

For further information

<https://www.hbm4eu.eu>



19th January 2021

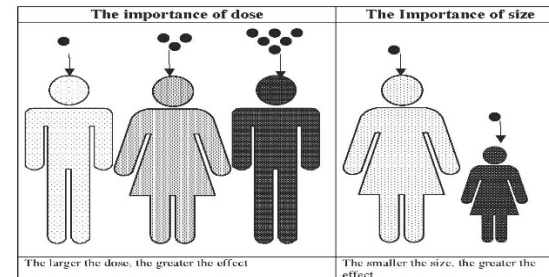
Why concern for pesticides?

Hazardous properties

- Pesticides are bioactive compounds designed to kill insects, plants, or fungi
- Most insecticides target the nervous system in insects – and have neurotoxic potential in other species
- Many pesticides have endocrine disrupting potential
- Some are suspected immunotoxic or carcinogenic

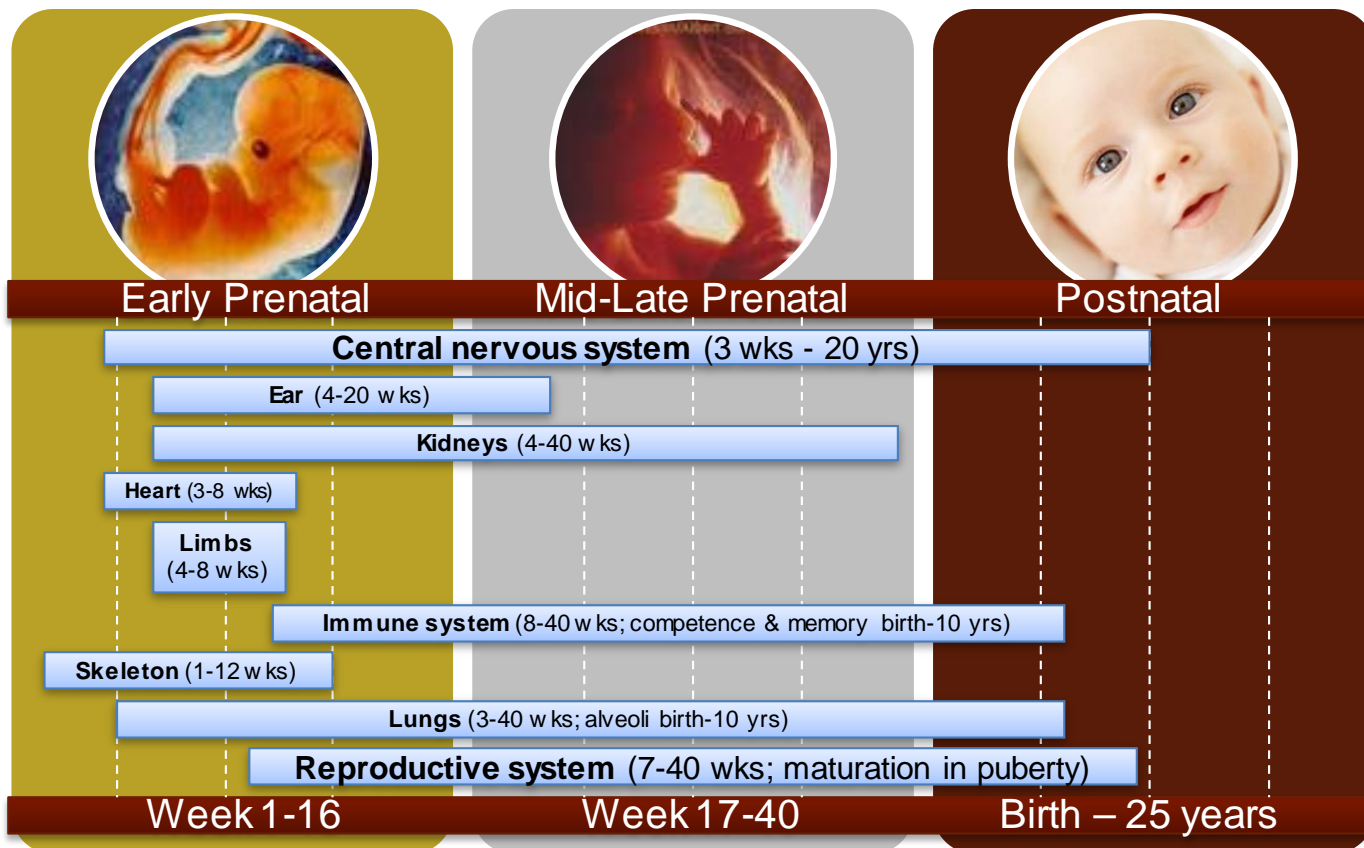
Human health risk depends on

- Exposure level – internal dose



- Exposure profile (mixtures)
 - Cocktail effects
- Vulnerability
 - vulnerable exposure windows during development

Windows of susceptibility



Source: Altshuler, K; Berg, M et al. *Critical Periods in Development*, OCHP Paper Series on Children's Health and the Environment, February 2003.

Developmental processes are easily disrupted during time windows of rapid growth and development. Disturbances may be permanent and increase the risk of dysfunction and disease later in life



What policy questions related to the Farm and Fork Strategy will HBM4EU address?



1. What are the current exposure levels and patterns of the EU general population to pesticides?
2. What are the main dietary sources of exposure across the member states?
3. What other exposure sources and pathways are important?
4. Are the current exposure levels of vulnerable groups, such as pregnant women and children, and inhabitants of hotspot areas, of health concern?



Activities:

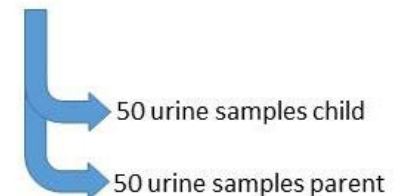
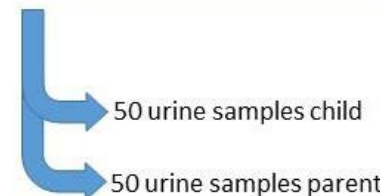
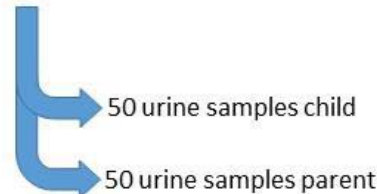
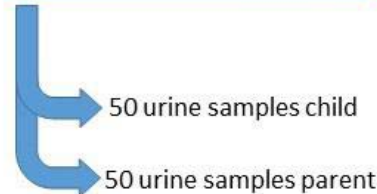
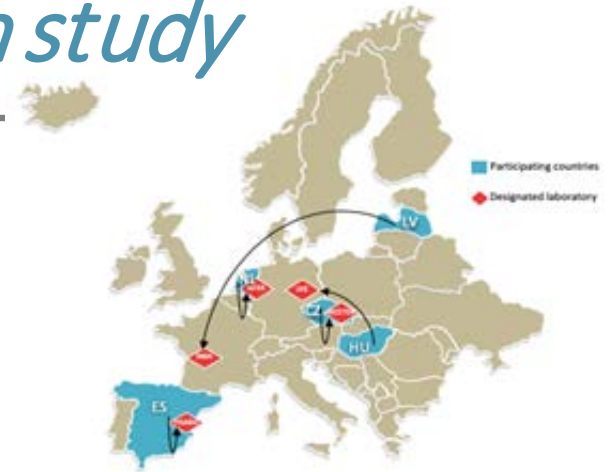
- Biomarkers of internal exposure based on urine samples
- Existing EU biomonitoring data
- New harmonised data in 2021 (aligned studies)
 - children - 8 countries
 - adults - 2 countries
- Exposure in “Hotspot area”
- Health risk
 - Associations with health outcomes
 - Key mechanism/AOPs
 - Relevant effect biomarkers



Hotspot area – the SPECIMEn study

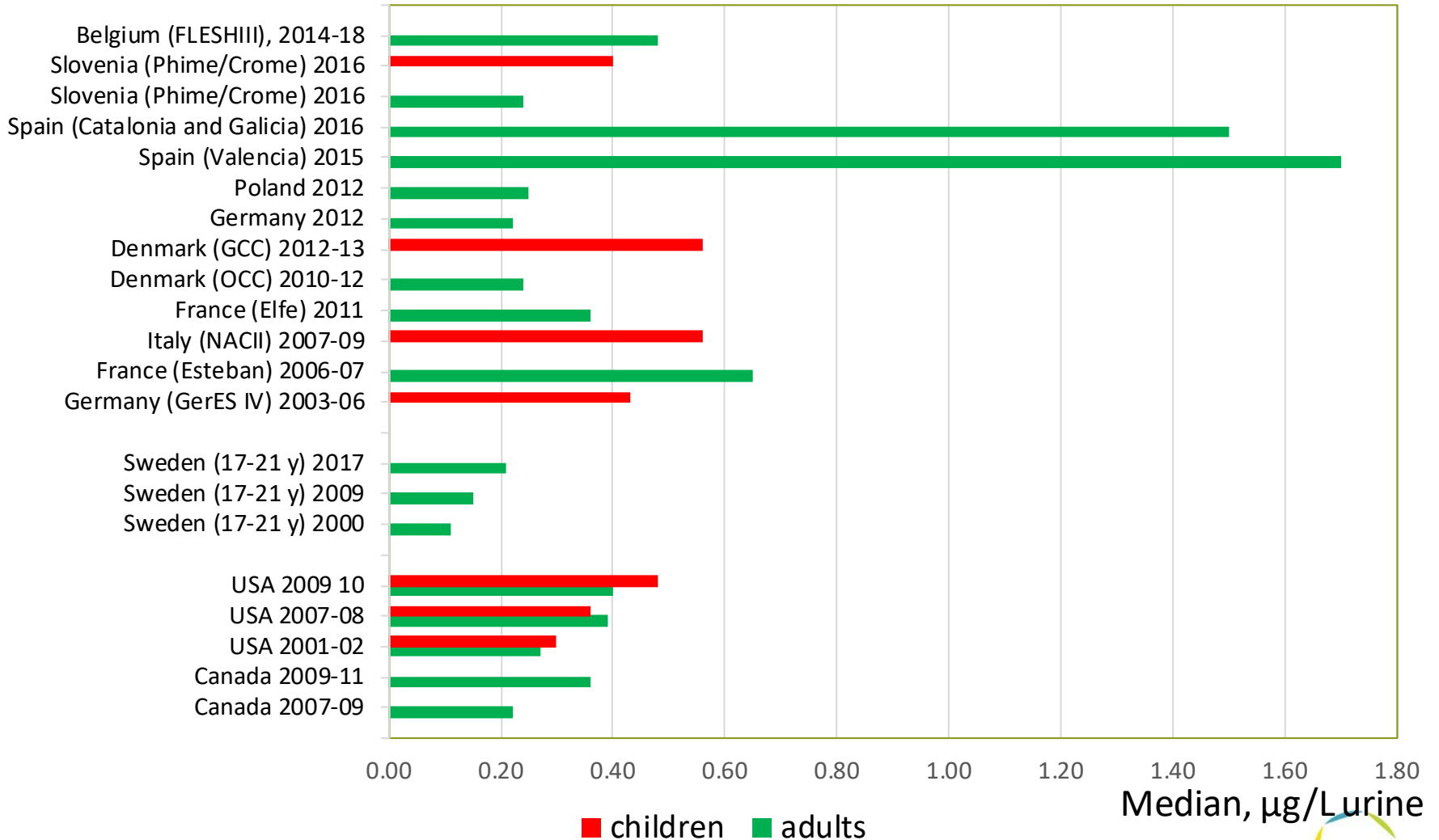
A hotspot area is within 250m from an orchard

Harmonized suspect screening method (multiple pesticides/metabolites) → exposure profile



19-01-2021

Urinary concentration of 3PBA (combined exposure to pyrethroids) in different populations – urine samples collected 2000-18





Maternal urinary concentrations of pyrethroid and chlorpyrifos metabolites and attention deficit hyperactivity disorder (ADHD) symptoms in 2-4-year-old children from the Odense Child Cohort

Louise Dalsager^{a,*}, Bettina Fage-Larsen^b, Niels Bilenberg^b, Tina Kold Jensen^{a,c}, Flemming Nielsen^a, Henriette Boye Kyhl^c, Philippe Grandjean^a, Helle Raun Andersen^a

Table 2

Maternal urinary concentrations of chlorpyrifos (TCPY) and pyrethroid metabolites (ug/L) among 948 mothers from the Odense Child Cohort.

Metabolite	LOD (ng/mL)	Detectable (%)	Percentiles			
			25	50	75	Max
TCPY	0.3	90.4	0.78	1.61	3.09	65.91
3-PBA	0.03	94.4	0.14	0.24	0.46	29.3
4-F-3PBA	0.2	0.1	< LOD	< LOD	< LOD	2.90
<i>Cis</i> -DCCA	0.5	2.8	< LOD	< LOD	< LOD	20.1
<i>Trans</i> -DCCA	0.4	11.4	< LOD	< LOD	< LOD	21.16
<i>Cis</i> -DBCA	0.5	3.0	< LOD	< LOD	< LOD	1.97



Maternal 3-PBA was associated with higher ADHD-score

How can HBM4EU support the Farm to Fork Strategy?

Human biomonitoring data on pesticides can be used to

- Establish baseline of exposure levels – will allow assessment of the effectiveness of measures implemented to reduce human exposure
- Improve risk assessment by providing reliable information on human internal exposure via multiple exposure sources and pathways



Thanks for your attention!

And thanks to all HBM4EU partners and colleagues involved in the "pesticide work"



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