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EMBARGOED UNTIL FEBRUARY 5, 2019 at 11.30pm UK time / 6.30pm ET time

Exposure to Chemical Substances Before and After Birth is Associated With a Decrease in Lung Function in Children

A European study, published in The Lancet Planetary Health, analyses for the first time the impact of the exposome on respiratory health

Barcelona, 4 February, 2019-. A study codirected by the Barcelona Institute for Global Health (ISGlobal), an institution supported by "la Caixa", and the French Institute for Health and Biomedical Research (INSERM), in collaboration with other European teams, concludes that **early life exposure to different chemicals – parabens, phthalates and perfluoroalkyl substances (PFAS) – is associated with reduced lung function in children**. The study, published in *The Lancet Planetary Health,* was performed with data from more than 1,000 mother-child pairs and is one of the first to apply a comprehensive exposome approach.

We are continuously and simultaneously exposed to a **wide range of environmental factors** including changing climate, air pollution in urban settings and at home and chemical substances. The totality of these exposures is referred to as the exposome. To date, numerous studies have addressed the effect of environmental determinants on respiratory health, but most had focussed on single exposures or a single family of chemicals.

"This is the **first study that applies an exposome approach** to identify associations between **pre- and childhood exposure to a range of important environmental factors and impairment of lung function**, thereby representing a new paradigm in environmental health research", explains **Martine Vrijheid**, ISGlobal researcher and co-coordinator of the study.

The new study, performed under the European HELIX project, analysed data from **1,033 mother-child pairs from six European countries**: Spain, France, Greece, England, Lithuania and Norway. The researchers measured **85 exposures during pregnancy and 125 during childhood**, relating to outdoor, indoor, chemical and lifestyle factors. Lung function was measured by spirometry in children at 6 and 12 years of age.

The results show that **prenatal exposure to two types of perfluoroalkyl substances, aka PFAS, – PFOA and PNFA- was associated with a decrease lung function**. PFAS are used as stain and water repellents and are found in many household products and food packages. They can be absorbed by the organism, through food or water for example, and then be passed to the unborn baby through the placenta.

Regarding **exposures during childhood**, the study identified **nine exposures** associated with impaired lung function. **Five phthalate metabolites including DEHP and DINP** — which are used as plasticizer and can be ingested, inhaled or absorbed through the skin – showed the strongest association. An association was also found with **ethyl-paraben**, a phenol compound used in cosmetics, and with **copper**, which in the general population is ingested mainly through drinking water and diet. Finally, **house crowding** and **high density of facilities around school** were also associated with lower lung function.

"**These findings have important implications for public health**", concludes Martine Vrijheid. "**Preventive measures to reduce exposure to the chemical substances identified**, including a stricter regulation and the labelling of consumer products to better inform the public, could help prevent lung function impairment in childhood and benefit health in the long-term", she adds.

Reference

Lydiane Agier, Xavier Basagaña, Lea Maitre, Berit Granum, Philippa K Bird, Maribel Casas, Bente Oftedal, John Wright, Sandra Andrusaityte, Montserrat de Castro, Enrique Cequier, Leda Chatzi, David Donaire-Gonzalez, Regina Grazuleviciene, Line S Haug, Amrit K Sakhi, Vasiliki Leventakou, Rosemary McEachan, Mark Nieuwenhuijsen, Inga Petraviciene, Oliver Robinson, Theano Roumeliotaki, Jordi Sunyer, Ibon Tamayo-Uria, Cathrine Thomsen, Jose Urquiza, Antonia Valentin, Rémy Slama, Martine Vrijheid*, Valérie Siroux* *Contributed equally. Early-life exposome and lung function in children in Europe: an analysis of data from the longitudinal, population-based HELIX cohort. *The Lancet Planetary Health*. February 5, 2019. 10.1016/S2542-5196(19)30010-5.

(The link to the publication will work after the embargo)

About ISGlobal

The Barcelona Institute for Global Health, ISGlobal, is the fruit of an innovative alliance between "la Caixa" and academic and government institutions to contribute to the efforts undertaken by the international community to address the challenges in global health. ISGlobal is a consolidated hub of excellence in research that has grown out of work first started in the world of health care by the Hospital Clínic and the Parc de Salut MAR and in the academic sphere by the University of Barcelona and Pompeu Fabra University. The pivotal mechanism of its work model is the transfer of knowledge generated by scientific research to practice, a task undertaken by the institute's Education and Policy and Global Development departments. ISGlobal a member of the CERCA programme of the Generalitat de Catalunya.

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