

## Press Release

**Embargoed until:** 13<sup>th</sup> November 2018

**Date:** 13<sup>th</sup> November 2018

### New study shows an epigenetic link between prenatal exposure to maternal smoking and offspring's cardio-metabolic health

New study shows an epigenetic link between prenatal exposure to maternal smoking and offspring's cardio-metabolic health

According to new research, epigenetic changes found in the offspring exposed to maternal smoking during pregnancy or in current smokers are linked to smoking-related diseases in adulthood.

The study identified lower DNA methylation at GFI1, a compelling smoking-related locus that associates with increased risk for adult BMI, blood lipids and blood pressure levels. This study arose from a large international collaboration between 17 research academic organisations, organised under the Global MethQTL and DynaHEALTH consortia, linking data from Europe, the US and Australia. This collaborative effort from a long-lasting cooperation between the University of Oulu (Finland) and Imperial College London (United Kingdom) sheds light on our understanding of the multidimensional components of life-long health and development of chronic diseases. The new findings are published in the journal EBioMedicine, published by The Lancet.

Cigarette smoking accounts for nearly 6 million deaths annually and even former smokers are at long-term risk of developing cardio-vascular diseases. Similarly, exposure to maternal smoking during pregnancy has undue immediate consequences (low birth weight, pre-term birth etc.) as well as predisposing the child to risk for cardio-metabolic risk factors in later life. However, despite the known risk, worldwide 53% of women who smoke daily continue to smoke during pregnancy, with the highest prevalence in the European region over the last years.

The mechanisms underlying these long-term effects need better understanding, as they are very likely due to direct biological effects combined with inherited behavioural and psychosocial factors. Previous research has identified many smoking-related epigenetic markers. Epigenetic processes such as DNA methylation essentially regulate gene expression without altering the gene's DNA structure. Changes in gene expression have implications on the development of diseases. This represents the largest study to discover the link between smoking related epigenetic markers and cardio-metabolic risk factors in adults.

For this study, researchers conducted meta-analysis on 22 studies, including methylation data on 18,212 adults aged from 16 to 81 years. Among these, 17% were found to be current

smokers. Data since pregnancy was available on 4,230 offspring, of which 18% were exposed to maternal smoking during pregnancy. Lower DNA methylation at GFI1 was consistently observed among participants exposed to smoking, and, this molecular biomarker associated with cardio-metabolic risk factors attributed to smoking, including changes in body mass index, blood pressure levels and hypertriglyceridemia.

The findings highlight important clinical implications. Epigenetic changes associate with cardio-metabolic risk in later life even among non-smokers exposed to pre-natal maternal smoking. "Such epigenetic loci might serve as objective biomarkers of past environmental exposures that could be used for preventive health measures. This discovery provides a strong foundation for further work to unravel emerging smoking epigenetic markers with downstream detrimental health outcomes" says lead author Priyanka Parmar from the University of Oulu.

Professor Marjo-Riitta Järvelin, group leader, points out "Our study shows compelling evidence that changes in epigenetic markers may persist over the life course of an individual. These findings are important for health policy makers to further draw attention towards increasing awareness on smoking cessation programmes and for better prevention strategies in maternity clinics and health centres."

Dr Sylvain Sebert, senior author from the University of Oulu highlights "This study also constitutes a proof-of-concept of the developmental and life-course complexity of health. Only 8 (out of 6000!) DNA methylation markers associated with prenatal exposure to maternal smoking were selected for this research. These represent only the tip of the iceberg where much research is needed to understand the molecular interactions, the causal pathways and the modifiable factors".

The article in EBioMedicine (2018) is "Association of maternal prenatal smoking GFI1-locus and cardio-metabolic phenotypes in 18,212 adults" by Priyanka Parmar et al. DOI: [10.1016/j.ebiom.2018.10.066](https://doi.org/10.1016/j.ebiom.2018.10.066).

**Notes to editors:**

See more at: [www.dynahealth.eu](http://www.dynahealth.eu)

This press release only reflects the author's view and the Commission is not responsible for any use that may be made of the information it contains.

**Contact Information:**

For information about the study:

Dr. Sylvain Sebert can be reached at [Sylvain.sebert@oulu.fi](mailto:Sylvain.sebert@oulu.fi); or telephone +358 50 3440842 or contact Professor Järvelin.

For information about DynaHEALTH:

Coordinator contact:

Professor Marjo-Riitta Järvelin, email [marjo-riitta.jarvelin@oulu.fi](mailto:marjo-riitta.jarvelin@oulu.fi) or [m.jarvelin@imperial.ac.uk](mailto:m.jarvelin@imperial.ac.uk). Telephone +358 40 5606043



Press contact:

Claire Webster, email [Claire.Webster@betatechnology.co.uk](mailto:Claire.Webster@betatechnology.co.uk), Telephone +44 1302 322633

## About DynaHEALTH

Partners:

- University of Oulu, Centre for Life Course Health Research and the Northern Finland Cohort Centre, Finland (Coordinator);
- Abbott, Spain;
- Academic Medical Centre, Amsterdam, the Netherlands;
- Beta Technology Ltd, UK;
- Brunel University London, UK;
- Erasmus University Medical Centre Rotterdam, the Netherlands;
- Imperial College London, UK;
- Institute of Diabetes Research, Helmholtz Zentrum München, Germany;
- Center for Clinical Research and Disease Prevention, Bispebjerg and Frederiksberg Hospital, The Capital Region, Copenhagen, Denmark;
- Laboratorios Ordesa, Spain;
- Ludwig-Maximilians-University of Munich, Germany;
- The Folkhälsan Research Centre, Finland;
- University College London, UK;
- University of Granada, Spain.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 633595.

## About Horizon 2020

Europe has a 10-year growth and jobs strategy called **Europe 2020**. It was launched in 2010 to create the conditions for smart, sustainable and inclusive growth. Five headline targets have been agreed for the European Union to achieve by the end of 2020, covering employment, research and development, climate/energy, education, and social inclusion and poverty reduction.

Europe has identified new engines to boost growth and jobs; these are addressed by seven '**flagship initiatives**'. Within each initiative both the European Union and national authorities have to coordinate their efforts, so they are mutually reinforcing. '**Innovation Union**' is one such flagship initiative. '**Innovation Union**' is the European Union strategy to create an innovation-friendly environment that makes it easier for great ideas to be turned into products and services that will bring our economy growth and jobs.

**Horizon 2020** is the financial instrument implementing the Innovation Union and:

- Has a budget of nearly €80 billion for the period 2014-2020 which makes it the biggest European Union Research and Development programme ever.
- Is open to everyone.



- Has three priorities (Industrial Leadership, Excellent Science and Societal Change); each of which has a number of sections with a different focus and each section has a detailed work programme.

<http://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>

#### **About EBioMedicine**

The International Journal of Obesity publishes the latest research on basic clinical and applied studies in biochemistry, physiology, genetics and nutrition, molecular, metabolic, psychological and epidemiological aspects of obesity and related disorders.