Children’s microvascular traits and air pollution exposure: the developmental origin of particle-induced disease

Leen J Luyten 1,2, Dockx Y 1, Provost EB 1,3, Madhloum N 1, Sleurs H 1, Neven KY 1, Janssen BG 1, Debacq-Chainiaux F 2, Gerrits N 3, Lefebvre W 3, Plusquin M 1, Vanpoucke C 4, De Boever P 1,3, Nawrot TS 1,5

Highlights

• PM2.5 or NO2 during pregnancy → Wider retinal diameters
• Prenatal NO2 increases vessel curvature (tortuosity)
• Postnatal exposure does not explain prenatal exposure effects

Methods

227 children from the ENVIRONAGE birth cohort
Exposure based on mothers’ home address
Clinical examination (BMI, blood pressure)
Retinal fundus images (MONA®)
Multivariable linear regression

Population characteristics:
Mean age of 4.6 (0.4) years
52% females
Central retinal arteriolar equivalent (CRAE) of 180.9 (14.2) µm
Central retinal venular equivalent (CRVE) of 250.9 (19.8) µm
Tortuosity index (TI) of 0.889 (0.012)

Background

Air pollution exposure affects fetal development and cardiovascular disease incidence
Wider retinal venular diameter is associated with coronary heart disease and increased vessel tortuosity is linked to ischemic stroke

Findings

CRAE, CRVE and TI measured between the age of four and six are associated with exposure to PM2.5 and NO2 during the entire pregnancy.
Models are unadjusted

Models adjusted for age, gender, mean arterial blood pressure, BMI, season of the follow-up examination, birth weight, maternal age, pre-pregnancy BMI, maternal education level and maternal smoking habits during pregnancy. *p ≤ 0.05

For more information: leen.luyten@uhasselt.be

1 Centre for Environmental Sciences, Hasselt University, Diepenbeek, Belgium
2 Unité de Recherche en Biologie Cellulaire (URBC) - Namur Research Institute for Life Sciences (Narilis), Namur University, Namur, Belgium
3 Health unit. Flemish Institute for Technological Research (VITO), Mol, Belgium
4 Belgian Interregional Environment Agency (IRCELINE), Brussels, Belgium
5 Department of Public Health & Primary Care, Occupational and Environmental Medicine, Leuven University, Leuven, Belgium