

COMPARISON OF ACUTE NEUROLOGICAL EFFECTS OF UFP EXPOSURE DURING EXERCISE AND REST

Inge Bos, *Flemish Institute for Technological Research (VITO), Mol, Belgium*

Maaïke Goekint, *Vrije Universiteit Brussel, Belgium*

Johan Bruyninx, *Flemish Institute for Technological Research (VITO), Mol, Belgium*

Rob Brabers, *Flemish Institute for Technological Research (VITO), Mol, Belgium*

Luc Int Panis, *Flemish Institute for Technological Research (VITO), Mol, Belgium*

Patrick De Boever, *Flemish Institute for Technological Research (VITO), Mol, Belgium*

Sophie Sarre, *Vrije Universiteit Brussel, Belgium*

Romain Meeusen, *Vrije Universiteit Brussel, Belgium*

Background and Aims: Long term exposure to air pollution, such as particulate matter, is associated to negative neurological effects, including neuroinflammation and cognitive decline. Regular exercise stimulates brain health and plasticity. Brain-Derived Neurotrophic Factor (BDNF), a neurotrophine, is suggested to play a key role in this process. However, recent evidence suggests that exposure to air pollution during exercise is about 4 times higher compared to rest, due to higher ventilation.

The first aim is to find out if a short exposure to a high concentration of ultrafine particles (UFP) during rest or exercise induces acute neurological effects. Effects are investigated by gene expression analysis of IL1•, IL1•, TNF•, IL6, COX-2 (inflammatory cytokines and mediators), NRF (transcription factor activated by oxidative stress), BDNF. The second aim is to investigate if there is a difference in effect size between UFP exposure during rest and exercise.

Methods: 24 male, Wistar rats were divided into 4 groups and each group (n=6) was exposed for 1.5 hours to 1 of 4 exposure scenarios. The four exposure scenarios included: peak UFP exposure during exercise, peak UFP exposure during rest, ambient air exposure during exercise, and ambient air exposure during rest. The miniCAST sootgenerator was used to create a peak UFP concentration of 10^7 particles/cm³ into an exposure chamber containing a treadmill. UFP concentration was monitored (DMS50) in the exposure chamber. Blood, hippocampus, bulbus olfactorius and frontal cortex were collected 24 hours after exposure. Hippocampal BDNF was analyzed by ELISA. All tissues were analyzed for gene expression by Q-PCR.

Results (preliminary) and conclusions: Hippocampal BDNF is not significantly increased ($p=0.16$) 24 hours after exercise (n=4) compared to rest (n=4), during ambient air exposure. Analysis of RNA quantity and integrity shows that the RNA meets the requirements that are needed for further gene expression analysis.