

## Personal exposure during cycling and health effects (PEDAL) – a semi-controlled crossover pilot study

Exposure to ambient particulate matter (PM) is a leading cause of global morbidity and mortality. Ultrafine particles (UFP), defined as particles with an aerodynamic diameter below 100 nm, are suggested to be specifically toxic due to their high number concentrations in ambient air, high mass-specific surface area, and high oxidative potential compared to larger particles at the same mass concentration. One of the most important urban sources of UFPs are combustion processes of motor vehicles. Cycling is a beneficial physical activity and an air pollution- and climate-neutral form of transportation. However, cyclists are often highly exposed to traffic-related air pollutants (AP) due to proximity to road traffic and increased minute ventilation. There are only a few studies dealing with exposure and health burden of cyclists in road traffic. The overarching aim of this study is to investigate the association of short-term personal exposure to traffic-related UFPs and health-related effects in humans during cycling in urban areas. The PEDAL pilot study is a semi-controlled crossover exposure study in which 13 healthy volunteers cycled for two hours (20 km) on a high and a low traffic route in the city of Düsseldorf in Germany. During these rides, ambient air pollutants (PN10-700nm, PM10, PM2.5, PM1, BC, NO2, and O3), wind, temperature, noise and GPS were measured continuously with instruments mounted on an accompanying cargo bike. Cardiovascular and respiratory examinations were conducted in the study center pre- and post-exposure. Preliminary results show that there is a difference in ambient air pollution depending on the route, possibly indicating an association with health related effects.



<b>Funding</b>	Forschungskommission der Medizinischen Fakultät der Heinrich-Heine - Universität Düsseldorf
<b>Duration</b>	01.10.2019 – 30.09.2020
<b>Team</b>	Vanessa Soppa, Meltem Baydak, Lina Glaubitz, Anna Buschka, Barbara Hoffmann (PI)
<b>External collaborators</b>	Tobias Pohl, Christian Fischer, Martin Lange, Tim Kramer, Konradin Weber (University of Applied Sciences, Laboratory for Environmental Measurement Techniques, Düsseldorf, Germany)
<b>Publications</b>	