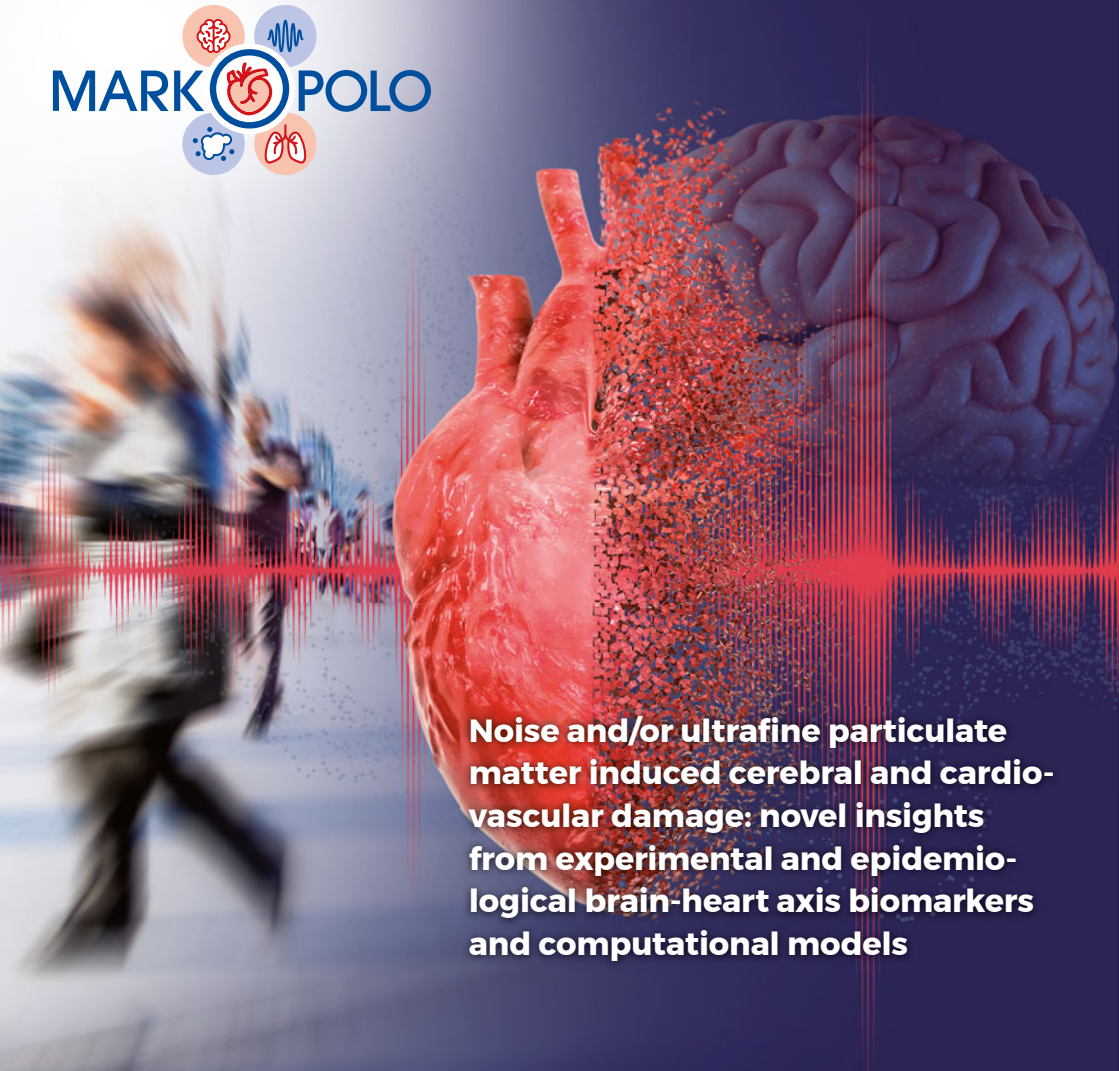
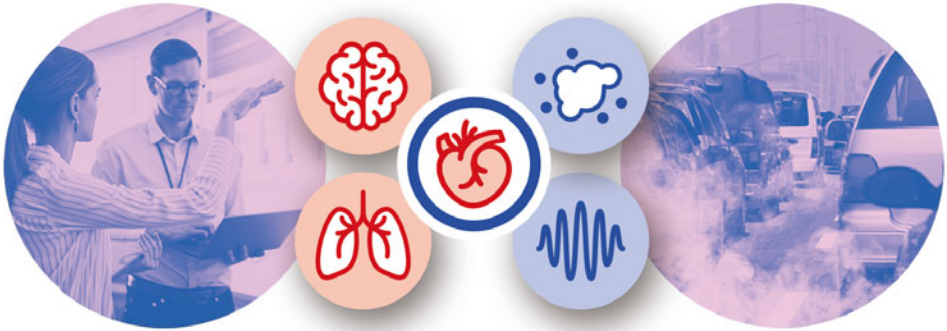
MARK POLO



Noise and/or ultrafine particulate matter induced cerebral and cardiovascular damage: novel insights from experimental and epidemiological brain-heart axis biomarkers and computational models



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VISION & RESEARCH

Traffic noise and air pollution, especially particulate matter (PM) and ultrafine particles (UFP), are closely linked environmental risk factors that contribute significantly to the development of diseases such as diabetes, hypertension and atherosclerosis.

MARKOPOLO aims to investigate the impact of traffic noise and air pollution, especially fine and ultrafine particulate matter, on human health through an innovative translational approach. Experimental and computational models are used in clinical, interventional and epidemiological studies. One of the main objectives is to identify disease-relevant biomarkers and to understand the molecular mechanisms involved in diseases of the brain, lung and cardiovascular system. The “from bench-to-bedside” approach uses extensive knowledge of the brain-heart connection and applies modern methods to better understand the causes of disease.

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MARKOPOLO will advance our understanding of the complex interplay between noise, air pollution, and human well-being.

- We aim to close gaps in knowledge and strengthen the evidence base for pollution-disease associations for traffic noise and air pollution (PM including UFP), especially synergetic interactions, and accounting for effects in susceptible groups and in different genders.
- We take a unique translational approach by implementing experimental/computational models, and clinical and epidemiological studies to provide FAIR data on associations between exposures and health outcomes.
- A primary goal is to identify disease-relevant biomarkers and causality mechanisms to understand the biological pathways of cerebral, pulmonary and cardiovascular health outcomes.
- Our "bench to life" approach is entirely driven by profound preclinical mechanistic knowledge and will use novel multi-omics methodology (e.g. redox/phosphoproteomics and "spatial" epigenetics), allowing the analysis of key pathomechanisms, to be included in exposure-response models. This will improve risk assessment and allow evaluation of the effectiveness of mitigation strategies.
- We will also consider the societal circumstances and policies at the national level and their impact on different stakeholders.

OBJECTIVES

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IMPACT

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Scientific

The project investigates the health impacts of noise and air pollution, emphasizing vulnerable populations and improving FAIR data practices. MARKOPOLO aims to uncover causal mechanisms for effective interventions, assess the role of UFP metrics in disease risk, and advocate for stricter UFP emission standards.

Socioeconomic

The project supports regulatory efforts by providing evidence for risk assessments, guidelines, and standards. It raises awareness of environmental hazards, reduces healthcare costs, and improves quality of life. MARKOPOLO addresses climate change impacts, aligning with the European Green Deal to create a healthier, more sustainable environment.

By pioneering a „bench to life“ approach to study the combined effects of noise and particulate matter (PM), including ultrafine particles (UFPs) and toxins, MARKOPOLO integrates diverse scientific disciplines to address both scientific and societal challenges.access to innovative, sustainable and high-quality health care.

Technological

The project enhances disease burden estimates by refining exposure-response functions and identifying key biomarkers for noise and UFP exposure. These advancements improve risk predictions, validate interventions, and leverage innovative tools and technologies.

MARKOPOLO is a four-year interdisciplinary project that brings together 15 partners from 10 countries.
Scientific coordination: UMC-Mainz – University Medical Center of the Johannes Gutenberg University Mainz (Germany)

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PARTNERS

MARKOPOLO IN A NUTSHELL

FULL PROJECT TITLE	MARKOPOLO – Noise and/or ultrafine particulate matter induced cerebral and cardiovascular damage: novel insights from experimental and epidemiological brain-heart axis biomarkers and computational models
START DATE	1st January 2025
DURATION	4 years
MEMBERS	15 institutions from 10 countries
EU GRANT AMOUNT	7.99 million Euro
SWISS GRANT AMOUNT	1.28 million Euro
SCIENTIFIC COORDINATOR	Univ.-Prof. Dr. Andreas Daiber
PROJECT MANAGEMENT	Juliane Dittrich (concentris)
PROJECT WEBSITE	**www.markersofpollution-markopolo.eu**

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