



HAL
open science

Innovative epidemiological design based on wearable microsenors to monitor mobility and related environmental exposures to better assess cardiovascular risks

Stephan Gabet, Djamal Achour, Sébastien Anthérieu, Nathalie Chérot-Kornobis, Suzanne Crumeyrolle, Luc Dauchet, Virginie Cleenewerck, Anne Garat, Celine Grare, Benjamin Hanoune, et al.

► **To cite this version:**

Stephan Gabet, Djamal Achour, Sébastien Anthérieu, Nathalie Chérot-Kornobis, Suzanne Crumeyrolle, et al.. Innovative epidemiological design based on wearable microsenors to monitor mobility and related environmental exposures to better assess cardiovascular risks. 36th Annual Conference of the International Society for Environmental Epidemiology (ISEE), Aug 2024, Santiago, Chile. hal-04768608

HAL Id: hal-04768608

<https://hal.univ-lille.fr/hal-04768608v1>

Submitted on 13 Nov 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

mobiCard

Mobility, related pollutions, and Cardiovascular health

Innovative epidemiological design based on wearable microsensors to monitor mobility and related environmental exposures to better assess cardiovascular risks

Stephan Gabet¹, Djamal Achour¹, Sébastien Anthérieu¹, Nathalie Chérot-Kornobis¹, Suzanne Crumeyrolle², Luc Dauchet³, Virginie De Broucker¹, Anne Garat¹, Céline Grare¹, Benjamin Hanoune⁴, and Jean-Marc Lo Guidice¹

¹ Univ. Lille, CHU Lille, Institut Pasteur Lille, ULR 4483 - IMPECS - IMPact de l'Environnement Chimique sur la Santé, F-59000 Lille, France

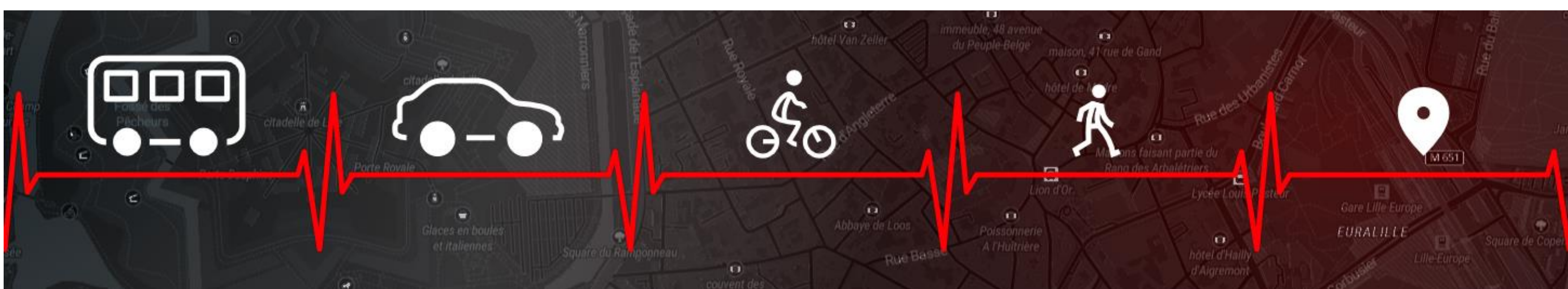
² CNRS, UMR 8518 - LOA - Laboratoire d'Optique Atmosphérique, Université Lille, Lille 59000, France

³ Univ. Lille, Inserm, CHU Lille, Institut Pasteur de Lille, U1167 - RID-AGE - Facteurs de risque et déterminants moléculaires des maladies liées au vieillissement, F-59000 Lille, France

⁴ Univ. Lille, CNRS, UMR 8522 - PC2A - Physicochimie des Processus de Combustion et de l'Atmosphère, F-59000 Lille, France

Context

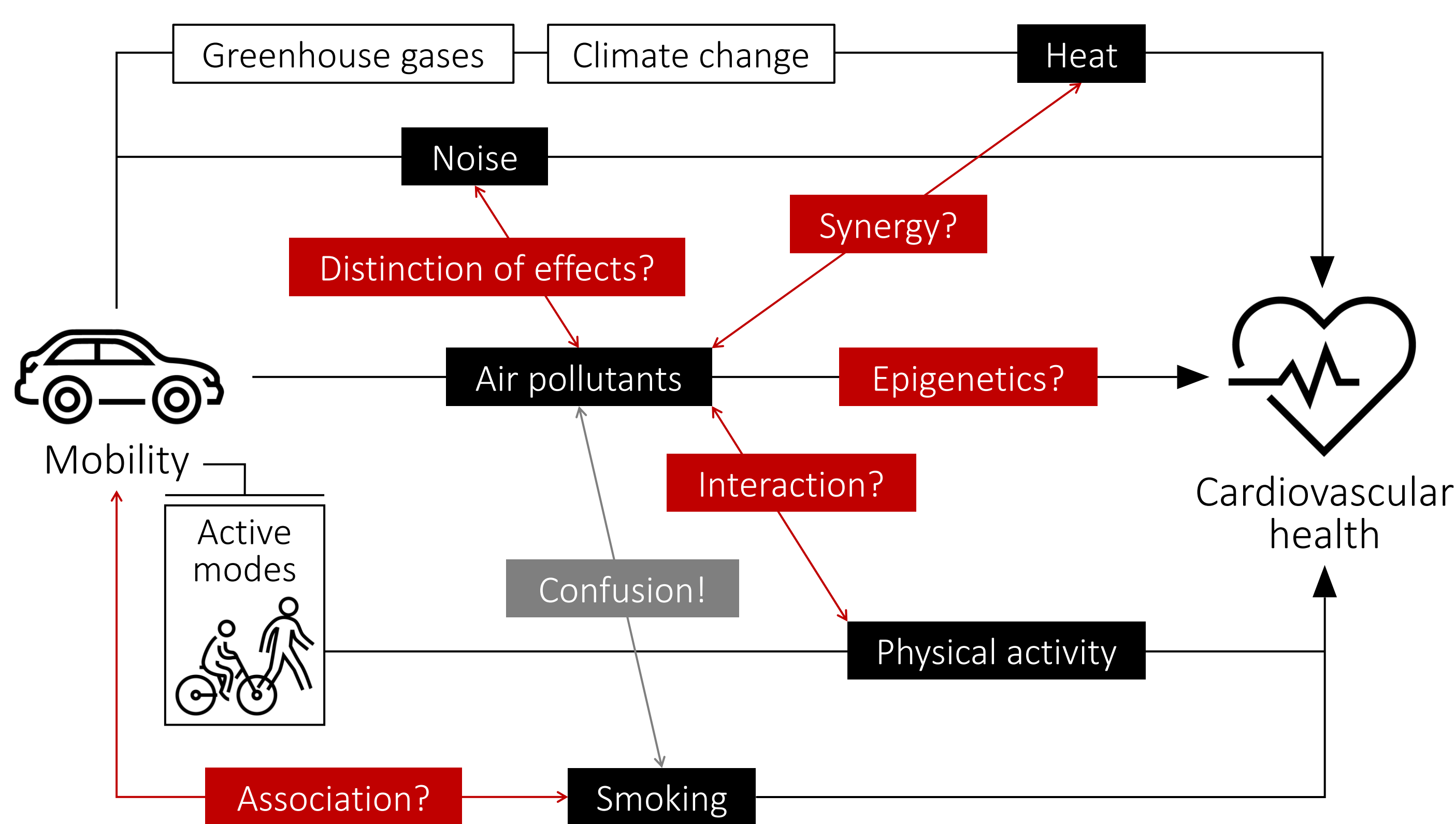
Cardiovascular diseases mainly include ischemic heart disease, stroke, high blood pressure, and heart failure. These diseases constitute, with around 19 million deaths per year, **the leading cause of death in the world**. The main controllable risk factors include **smoking, lack of physical activity, and air pollution**, the last two factors being directly linked to **mobility**. For instance, we contribute reduction of air quality by taking the car while we practice physical activity by bicycle. **Noise and temperature** can also be linked to mobility and cardiovascular health.



By mobility we mean the trips we make to go to work, do our shopping, reach our places of leisure... as well as the modes of transport we use: car, metro, walking, cycling... **Our mobility has a high impact on our environmental exposure levels, and thus on our cardiovascular health**. However, characterizing the interactions between various mobility-related exposures and their relationships with cardiovascular clinical parameters requires better understanding.

Objectives

The MobiCard research project aims to better investigate the **relationships between mobility-related exposures and cardiovascular clinical parameters**, also considering underlying pathways.



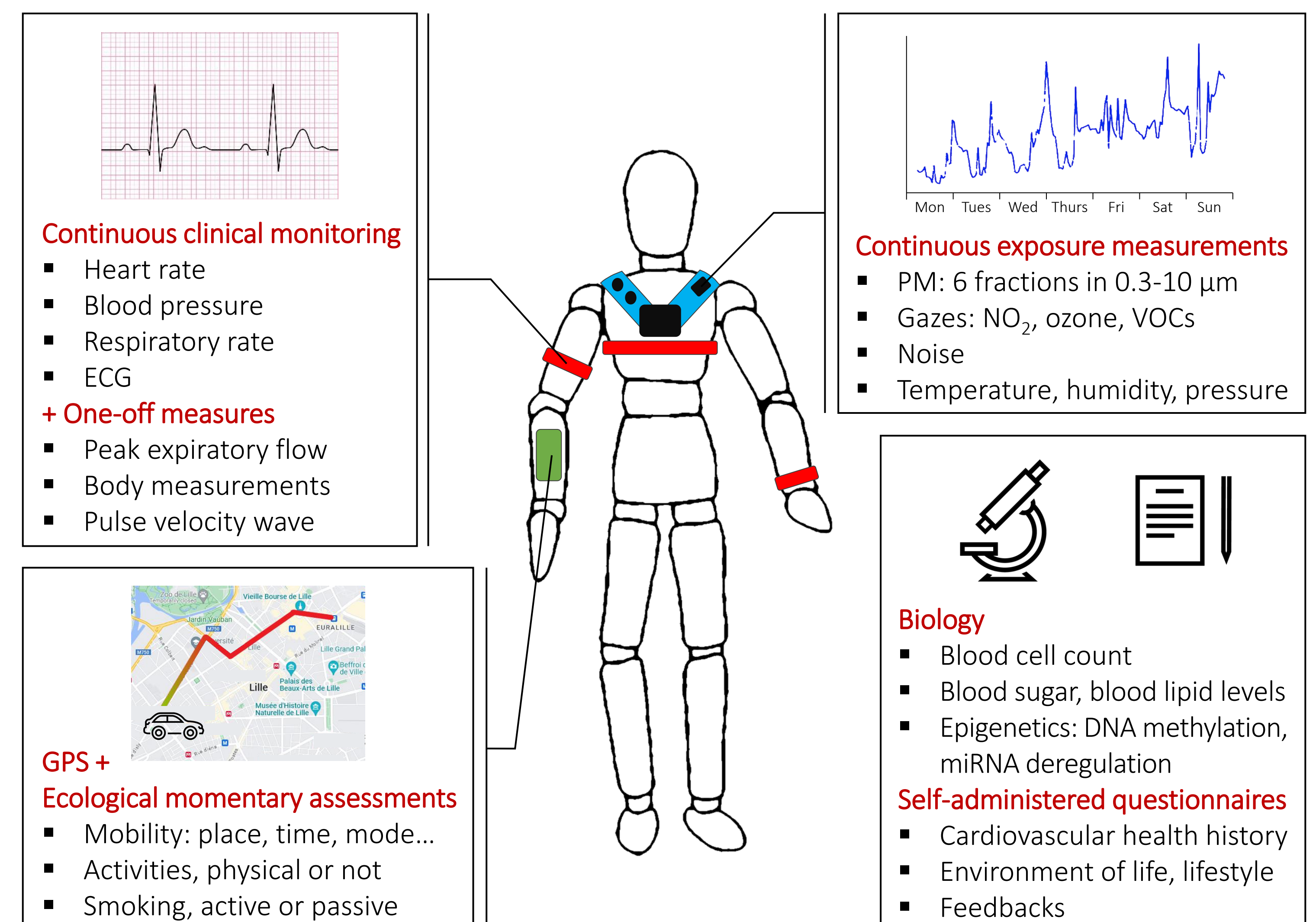
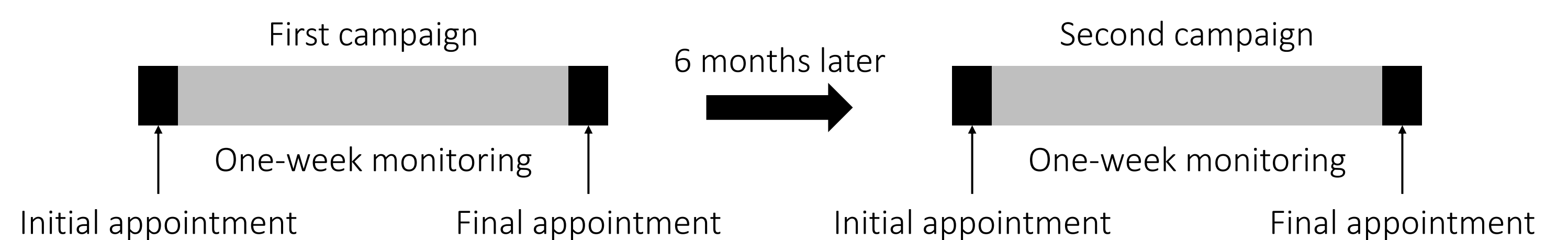
More specifically, MobiCard aims to:

- Study **how mobility influences exposure levels** to air pollutants (PM, NO₂, ozone, VOCs), noise, real and felt heat, physical activity and active and passive smoking.
- Study the associations of **short-term and long-term exposures** to these factors with clinical parameters such as heart rate, blood pressure, peak expiratory flow, and ECG.
- Study the **interactions between exposures**, and therefore the potential for modifying effects of the relationships with cardiovascular parameters.
- Investigate potential **underlying mechanisms** such as variations in epigenetics.

Methods

The originality of the MobiCard project, and also its greatest strength, is to propose **individual, continuous and simultaneous measurements** of mobility, related exposures, and clinical parameters.

MobiCard is an **observational monocentric population-based prospective cohort study**, carried out within the Lille conurbation (France) and designed to allow the recruitment of **400 participants in 2 years**. The inclusion criteria are: to be of legal age (18+), to be a resident of the Lille conurbation, and to have a good command of French (native or C1/C2).



Each participant will be offered a one-week monitoring with **wearable microsensors and connected devices**. Two appointments, at the start and at the end of the follow-up, are planned at the Lille University Hospital. The initial appointment will allow to equip the participant and to collect written consent while the final one will be organized to get back all the equipment and the volunteer's feedback as well as to perform anthropometric measurements and **blood and urine collection**. A similar monitoring campaign will be carried out 6 months later to assess the risks related to long-term exposure.

Expected Results

MobiCard should clarify the **relationships between variations over time** in mobility-related exposure levels and cardiovascular clinical parameters and provide a better understanding of **how mobility modalities can modify these associations**.

Timeline

