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Methodologies for the valuation of cardiorespiratory impact of complex aerosols : application to combustion emissions aerosols.

Debate between instillation and inhalation exposure of biological systems in term of cardio-respiratory impact is still conflicting. Rationale of this debate relies on aerosol pollutant bio-disponibility preservation during sampling, diluting and biological system exposure. We have developed specific designs for sampling, diluting complex aerosols for both in vitro and in vivo experimentations keeping the physicochemical properties of engine emissions while correcting for O₂, CO₂ and temperature to be compatible with requirements for biological viability. studies have been conducted at pollutant levels mimicking the situation that may occur in road tunnels (1:10 to 1:50 dilution ratio of modern car engines). Results will be presented and discussed for comparative in vitro/in vivo exposed lung tissue considering inflammatory, oxidative stress and DNA damage of lung tissue which closely parallel thus validating the in vitro model of rat lung tissue in organotypic cultures.

Recent interest for cardiac impact of these aerosols will be presented using a model of experimental of continuous electrocardiogram monitoring in myocardial infarcted rats to modelize the human chronic heart failure population known to be at higher risk during pollution episodes. Results clearly show a high impact of these aerosol in MI rats in term of arrhythmia induction while almost no impact of these aerosols was evidenced in healthy rats.

These in vitro and in vivo models represent a very useful and promising tool for the assessment of health impact potential of emission depollution strategies.

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