Acronimo - *TOX-IN-AIR*

Titolo del Progetto - *Evaluation of the role of natural and anthropogenic sources on acellular and in vitro TOXicity INdicators of AtmospherIc aerosol*

Programma di Finanziamento - PRIN2022 PNRR

Codice Progetto - P2022JKP2S

Settore ERC PE - Physical Sciences and Engineering

CUP - H53D23011350001

Ruolo Uniba - Responsabile di Unità di ricerca

Responsabile scientifico - Annarosa MANGONE

Referente amministrativo - Guido De Santis

Dipartimento - Chimica

Finalità

1) Investigate how acellular and intracellular toxicity indicators correlate one among the other and with the total and water soluble chemical composition putting in evidence seasonal and site dependencies.
2) Evaluate the contributions of the different natural and anthropogenic sources to the toxicological indicators and the nonlinear interactions among the sources and the toxicity metrics.
3) Develop new combined metrics to better represent the global toxicity of PM2.5 usable to plan future air pollution mitigation and monitoring strategies.

Abstract

Fine atmospheric particulate matter (PM2.5) is a major risk for public health, potentially leading to millions of premature deaths per year worldwide. The mechanisms and factors inducing PM2.5 toxicity are still not fully known and contrasting results are obtained when different acellular and cellular in vitro toxicity metrics are compared among themselves or with in vivo toxicity. This leads to major issues in air quality studies and pollution mitigation strategies: the detailed knowledge of the impact of PM2.5 sources on health effects; the most performant metrics to represent toxicity, especially in urban areas where there are combined effects of several anthropogenic sources.
The aim of the TOX-IN-AIR project is threefold:
1) Investigate how acellular and intracellular toxicity indicators correlate one among the other and with the total and water soluble chemical composition putting in evidence seasonal and site dependencies.
2) Evaluate the contributions of the different natural and anthropogenic sources to the toxicological indicators and the nonlinear interactions among the sources and the toxicity metrics.

3) Develop new combined metrics to better represent the global toxicity of PM2.5 usable to plan future air pollution mitigation and monitoring strategies.

TOX-IN-AIR will use state-of-the-art measurement techniques to trace PM2.5 concentrations, chemical compositions, and source contributions simultaneously at two sites (urban and urban background) and in two different seasons in the Puglia region (South Italy).

Risultati attesi

TOX-IN-AIR will provide:

1) a comprehensive speciated dataset of PM2.5 obtained with solubility fractionation;

2) a comprehensive dataset of PM2.5 acellular oxidative potential and intracellular toxicity on A549 cell line: cytotoxicity, oxidative stress, lipid peroxidation;

3) a dataset of number particle size distributions, meteorological parameters, and concentrations of gaseous pollutants.

These will be the input of statistical analysis and advanced source apportionment to understand the role of the different sources on PM2.5 toxicity and to develop new combined toxicity metrics. TOX-IN-AIR approaches will be fully scalable and applicable to other contexts and sites. Results will impact the scientific community with a better understanding of the relationship between air quality and public health. TOX-IN-AIR will have relevant societal impacts because the detailed knowledge of the role of urban sources on PM2.5 toxicity will be extremely useful in future planning of strategies for ecological transition, development of sustainable transport and cities, and mitigation of urban atmospheric pollution, foreseen in the Next Generation EU and in the Italian PNRR plan. TOX-IN-AIR foresees an intense communication and dissemination activity targeting different audiences: scientific community, local governments and environmental agencies, main international observation networks, general public, and high school students.

Partenariato

Consiglio Nazionale delle Ricerche

Università degli Studi di BARI ALDO MORO

Università del SALENTO

Evidenze pubbliche

- https://www.uniba.it/it/ricerca/dipartimenti/chimica/dipartimento/amministrazione-trasparente

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