Biomonitoring of the general population living near the waste incinerator of Turin: baseline levels of PCDDs, PCDFs, and PCBs


INTRODUCTION

In September 2013 a waste-to-energy (WTE) incinerator located in Turin area (Piedmont, Northern Italy) started to produce energy by the incineration of municipal solid wastes (421,000 tons per year burned).

AIM OF THE STUDY

- To evaluate the potential health effects on the population living near the plant, a health surveillance program (SPoTT) was implemented by the province of Turin. This program included a biomonitoring study aimed at assessing levels of metals, hydroxyl-polycyclic aromatic hydrocarbons (OH-PAHs), polychlorinated dibenzodioxins (PCDDs), dibenzofurans (PCDFs), and polychlorobiphenyls (PCBs) in a cohort of 400 subjects before the plant start-up and after some years of operation.
- This poster describes the concentrations of PCDDs, PCDFs, and PCBs in blood samples collected before the start-up of the WTE incinerator ("baseline" values of the biomonitoring study).

STUDY DESIGN

- The emissions from the incinerator were evaluated by a dispersion model;
- two different exposure areas were defined;
- a questionnaire was administrated to each subject on life environment and style, and work experiences;
- a minimum of 50 subjects per area were randomly selected by the local health units;
- the selected subjects had been living in the same area for at least five years.

RESULTS

- Significant differences in concentrations of the analyzed pollutants between genders (p < 0.05) were observed;
- Significant positive associations between the age and the concentrations of all the contaminants (p < 0.001) were observed in whole- and male datasets.

CHEMICAL ANALYSIS

Individual samples were added with 13C-labeled PCDDs, PCDFs, and PCBs used as internal standards. Serum proteins were denatured by isopropanol/formic acid mixture and the lipidic fraction extracted with hexane. Clean-up was carried out by an automatic DEXTech™ System (LCTech GmbH, Dorfen Germany). The quantification of analytes was performed by using high-resolution gas chromatography coupled with high-resolution mass spectrometry (DFS, Thermo Fisher Scientific).

EXPOSURE AREA (predicted metal deposition) | Subjects | Females | Males | Total
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Area 1 (≤ 0.007 mg/m²/year) | unexposed | 25 (36-49)* | 27 (36-50)* | 52 (36-50)*
Area 2 (> 0.014 mg/m²/year) | potentially exposed | 25 (36-50)* | 25 (36-49)* | 50 (36-50)*

Temporal trends of PCDDs, PCDFs, and PCBs in the general population living near the waste incinerator of Turin will be assessed.

NEXT STEPS