



6th International Symposium Federation of European Societies on Trace Elements and Minerals



Monastero Benedettino - Benedictine Monastery

NEW HORIZONS ON TRACE ELEMENTS AND MINERALS ROLE IN HUMAN AND ANIMAL HEALTH

ABSTRACT BOOK

*Catania, Italy
26-28 May 2016*

CANCER RISK FROM HEAVY METAL EXPOSURE IN RECYCLING WASTE OF ELECTRICAL AND ELECTRONIC EQUIPMENT: PRELIMINARY RESULTS FROM THE WEEENMODELS EUROPEAN LIFE PROGRAM

Federica Violi¹, Alberto Modenese¹, Fabriziomaria Gobba¹, Anna Maria Ferrari², Bianca Rimini², Rita Gamberini², Martina Pini², Paolo Neri², Tommaso Filippini¹, Luigi Grasselli², Pinuccia Montanari³, Marco Vinceti¹

1 Department of Biomedical, Metabolic and Neural Sciences, Public Health Section, University of Modena and Reggio Emilia; 2 Department of Sciences and Methods for Engineering, University of Modena and Reggio Emilia; 3 Sustainability Environmental Project, University Library System, University of Modena and Reggio Emilia

Background and objectives: When electrical and electronic equipment reaches its end of life, it becomes 'Waste Electrical and Electronic Equipment' (WEEE). The growing amount of this type of waste has posed significant challenges to waste management, since WEEE contains a whole range of toxic chemicals having relevant environmental and health implications. The WEEE life cycle may expose the general population and workers to various toxic chemicals, such as heavy metals.

We conducted a health risk assessment to evaluate the cancer risk derived from environmental and occupational exposure to trace elements from different recycling procedures (electronic scrap in blister copper, treatment of metals recovery in copper smelter, treatment of shredding, pyrometallurgical treatment of Li-ion battery). We considered the typical production of WEEE in a municipality of 150.0000 inhabitants, where a Life Cycle assessment (LCA) was carried out. Methods: Outdoor (1km² around a WEEE treatment plant) and indoor (factory volume of 3200m³) emissions generated from the above-mentioned procedures were computed, to perform a health risk assessment for occupationally-exposed workers and for the general population around the plant. Dose of the heavy metals cadmium, nickel, arsenic inhaled by the potentially exposed population was estimated using the values obtained through a toxicological model. Cancer risk due to inhalation was calculated using the method proposed by the California Office of Environmental Health and Hazard Assessment.

Results and Conclusions: For the heavy metals considered, generated from WEEE treatment, these preliminary results show negligible cancer risk for the general population. On the converse, some risks may be present for occupational exposures linked to specific procedures (from cancer risk of $1,42 \times 10^{-3}$ for men working in shredding procedure and exposed to nickel to cancer risk of $4,68 \times 10^{-4}$ for women working with electronic scrap and exposed to arsenic).