Human biomonitoring in the area around the petrochemical site of Gela, Sicily-Italy

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Introduction

Close to the town of Gela, Sicily-Italy a petrochemical site is operating since 1962. A power station, chemical plants and an oil refinery plant are included. In 1990 a large area around the site was declared 'at High Risk of Environmental Crisis'; in 2000 a subarea was designated 'Reclamation Site of National Interest'. Extremely high concentrations of hazardous chemicals have been measured in soil, surface and groundwater, in marine water and sediments. Mortality, hospital discharges and birth defects were reported higher than neighbouring areas and other references. Mortality 1960-2002 of petrochemical workers showed an increased lung cancer risk for residents in Gela.

Objectives

Exposure assessment of residents' population by using of human biomonitoring (HBM).

Materials and methods

Several metals (As, Be, Cd, Cu, Hg, Pb, Se, Sb, Tl, V) in urine and blood, and organochlorinated compounds (OCs) in serum (59 PCB congeners and 12 pesticides) were measured in individual samples.
Randomly selected subjects (N=186) and volunteers (N=76) from 42,545 residents aged 20-44 were collected. Individual interviews by questionnaire were conducted. Geometric means and percentiles were compared with data obtained in two Italian areas without industrial plants, existing Threshold Limit Values, data from European HBM and US-NHANES.

Results

Arsenic showed several individual samples with moderate to high concentration values, both in urine and in blood (in urine random samples: GM=16.4 μg/l; P75=48 μg/l; P95=352 μg/l).
Exposure levels for the other metals and OCs were comparable to references, with the exception for few outliers values.

Conclusions

Arsenic speciation and re-analysis of altered markers were recommended and are in progress. The results of the first Gela HBM survey suggest interventions to reduce industrial pollution, and deeper investigations on pathways of exposure and on exposure-effects associations, to set up an environment and health surveillance system.