Assessment of Worker's Contamination Caused by Air Pollution Exposure in Industry Using Biomonitors

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Contamination by metals is a health hazard among workers from different plants. However there are no records of the level of metal concentration in the environmental air in industry, not even any records of the level of contamination of factory workers. Statistical surveys about occupational diseases usually refer to accidents and damages and not to the occupational diseases developed through long exposures to hazardous working conditions. The workplace exposures are registered when the acquisition of the disease is obvious or probable, that is, dangerous diseases easily identified. Most often the onset of the diseases goes unnoticed.

Galvanising industry was chosen as the object of this study. The worker exposure and contamination levels were assessed by means of airborne particulate matter collected in air filters and biomonitors hair, urine and toenails. The analysis of the samples was carried out by k0 Instrumental Neutron Activation Analysis, determining 21 elements. The statistical analysis such as multivariate analysis and ANOVA methods were applied to elemental concentration and copper and iron elements were highlighted as the main contributors on the differentiation of the classes.

The results showed the high level of pollutants which the workers are exposed to inside the galvanising factories: 92.3% of the elements were determined in air filters and in biomonitors. Many studies have been developed concerning this industrial process broaching many aspects including chromium and nickel contamination consequences. So far no study has pointed out the detection and measurement of other elements such as silver, gold, antimony, arsenic - elements not considered essential for human being and revealed in this study. Neither other elements considered essential were determined but they were determined in this project in high concentrations, playing, maybe, a role as toxic. The results point out the effectiveness of biomonitors and also the importance to carry out the airborne particulate matter sampling in parallel to biomonitors mainly in occupational epidemiological and group studies.