

EXPOSURE TO MANGANESE IN HIGH VEHICLE TRAFFIC AREAS WITHIN GUADALAJARA, MEXICO

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Background and Aims: The main source of PM₁₀ in Guadalajara's metropolitan area is its vehicle fleet which has increased at rates even higher than those of population growth. In 2010, research on high-traffic areas began in order to establish the facts concerning the presence of heavy metals due to this source.

Methods: Sampling of particulate matter was undertaken in May, 2010, at roadways with over 50,000 vehicles per day, using a portable sampler for particles under 10 microns MicroVol – 1100 low Flow-rate Air Sampler. Analysis of particulate matter was conducted using an X-ray fluorescence spectrometer, S4 Explorer.

Results: Traffic flow varied from 3,078 to 5,664 vehicles per hour. The analyses conducted on the PM₁₀ were: Al, Cd, Cu, Cr, Fe, Mn, Mo, Ni, Pb and Zn.

Aluminum and Manganese were the metals which showed the highest results, over 10 ppm and 46 ppm respectively. The main source of Aluminum was determined not to be the vehicle fleet but rather cement factories and soil erosion, while the source of manganese did prove to be gasoline burned by motor vehicles. The amounts of aluminum varied significantly depending on the wind and proximity to the sources. This variation is much lower for manganese which registered similar quantities for samples taken at the edge of roadways and those taken 100 meters away.

Conclusions: The main manner in which Mn enters the human body is through inhalation or ingestion. Although it has not been found to have carcinogenic effects, it can affect brain development in children, bringing about changes in behavior and a decrease in the capacity to learn and remember; thus it is important to implement monitoring systems.

References:

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