POTENTIAL ADVERSE HEALTH EFFECTS IN ANGOLA DUE TO HEAVY METALS EXPOSURE

Maria E. Gomes1,2,3, Clement G. Yedjou3, Maria L. Morais3, Carlos M. Baptista3 and Paul B. Tchounwou1,2

1University of Science Agostinho Neto, Angola
2Environmental Toxicology Research Laboratory, 3Cellomics and Toxicogenomics Research Laboratory, NIH-RCMI Center for Environmental Health; College of Science, Engineering and Technology, Jackson State University, 1400 Lynch Street, P.O. Box 18540, Jackson, Mississippi, USA

Abstract: Heavy metals are natural constituents of the Earth's crust. They are stable and cannot be degraded or destroyed, and therefore they tend to accumulate in soils and sediments. In trace amounts, heavy metals are necessary to maintain good health. However, at high concentrations they become hazardous by causing acute or chronic toxicity. Acute exposure to heavy metals can be associated with neurological damage, behavioral disorders, loss of memory, and other negative health effects. Each metal has a unique features and physico-chemical properties that confer to its specific toxicological mechanisms of action. Hence, the goal of the present study was to monitor and assess the level of heavy metals in soil samples collected in the city of Luanda located in Angola, Africa. To achieve this goal, the Niton handheld XRF analyzer was used to measure the levels of various heavy metals in soil samples collected from Luanda (the largest city in Angola). The level of each heavy metal detected was compared to Environmental Protection Agency (EPA) standards and regulatory guidelines. Among the soil samples tested, we detected several metals with means ± SDs values of 20.9 ± 10.0 ppm arsenic, 50361.98 ± 387.51 ppm calcium, 63.69 ± 14.48 ppm copper, 22085.74 ± 238.13 ppm iron, 270.70 ± 12.52 ppm lead, 330.95 ± 48.14 ppm magnesium, 14614.94 ± 352.25 ppm potassium, 1674.66 ± 41.58 ppm rubidium, 176.03 ± 5.14 ppm strontium, 1376.30 ± 345.52 ppm sulfur, 3550.54 ± 113.12 ppm titanium, 254.16 ± 15.68 ppm zinc, 818.42 ± 11.23 ppm zirconium in Luanda soil. We observed that the concentrations of each metal vary significantly from one site to another. The levels of many metals detected above the EPA standards and regulatory guidelines. Based on the EPA standards and regulatory guidelines, we conclude Luanda soils in Angola are contaminated with heavy metals, and this environment is not safe for children activities.

Key words: Heavy metals, EPA standard, XRF analyzer, Luanda Soil, health effects

Acknowledgements: This research was financially supported in part by the University of Science Agostinho Neto, Angola and by a grant from the National Institutes of Health (Grant No. 2G12RR013459-11), through the RCMI-Center for Environmental Health at Jackson State University.