Th1/Th2 CYTOKINE EXPRESSION IN CHILDREN EXPOSED TO METALS FROM MINE TAILINGS

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Abstract: Information on the immunological effects of simultaneous exposure to several metals is limited and the available information on children’s immune response is scarce. We evaluated the association between metal exposure, basal and stimulated mRNA expression of cytokines involved in Th1 (IL-12, IFN-γ) and Th2 (IL-4 and IL-10) response in 50 children aged 6-11 years living in the vicinity of mine tailings. All metals, except Pb, were measured in urine. The mRNA expression of cytokines in unstimulated and stimulated peripheral blood mononuclear cells (PBMCs) or monocytes was evaluated by RT-PCR. The percentage of children with levels above German reference values (RV) were as follows: CrU, NiU, CoU, MnU and BaU 100%, PbB 94%, CdU 91%, CuU 66%, AsU 46%, HgU 30%, ZnU 9% and MoU 3%. In the basal condition, IFN-γ mRNA expression was negatively associated with PbB (p=0.001), whereas a positive association was found for MnU (p=0.000). The basal IL-12 mRNA expression was negatively associated with CdU (p=0.012) and PbB levels (p=0.013), but was positively associated with MoU (p=0.037). In PHA-stimulated PBMCs, IFN-γ mRNA expression was negatively associated with AsU (p=0.015), PbB (p=0.010) and positively with HgU (p=0.002). No significant associations between the basal and activated IL-4 and IL-10 expression and metal levels were found. Children were exposed simultaneously to several metals and exposure to some metals was negatively associated with mRNA expression of Th1 type cytokines but not with Th2 type, suggesting an altered Th1/Th2 balance.

Keywords: Metals; immunotoxicity; children; Th1/Th2 cytokines; Th1/Th2 balance; mine tailings.

Acknowledgments: This research was supported in part CONACYT GUE-C01-2002-5456 and CONACYT-46297-M.