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Very low nanomolar concentrations of antimony impair adipogenesis and endoplasmic reticulum homeostasis during 3T3-L1 murine preadipocytes differentiation

Abstract: Antimony (Sb) is a metalloid broadly present in plastics used for food packaging, toys and other household items. Since Sb may be released by these items and get contact with humans, health worries for potential exposure have been raised. The effect of Sb on human tissues is still controversial, and biochemical mechanisms of toxicity are lacking. In this study, the effects of very low nanomolar concentrations of Sb(III), able to mimic chronic human exposure, were evaluated in 3T3-L1 murine preadipocytes during their differentiation into mature adipocytes. Low nanomolar Sb exposure (range: 0.05-5 nM) induced lipid accumulation and a strong increase in C/EBP- β and PPAR- γ levels, the main regulators of adipogenesis. The Sb-induced PPAR- γ levels were reverted by the estrogen receptor antagonist ICI 182,780. Moreover, Sb promoted preadipocytes proliferation inducing G2/M phase and this effect was linked to reduced levels of p21. In addition to these metabolic dysfunctions, Sb triggered the proinflammatory NF- κ B pathway and altered endoplasmic reticulum (ER) homeostasis inducing reactive oxygen species increase, ER stress markers (XBP-1s and pEIF2a) and downstream genes (GRP78 and CHOP). This study, for the first time, supports the obesogenic activity of low concentrations exposure to Sb during preadipocytes differentiation.

Biography: Prof. Antonio Speciale obtained a Ph.D. in Toxicology at the University of Messina (Italy) in 2009, and completed is training in the Pharmacogenetics Working Group at Virginia Commonwealth University (Richmond, VA, USA). He is also Specialist in Pharmacognosy since 2013. Currently, Prof. Speciale serves as Associate Professor in the field of Pharmacology at the School of Pharmacy of the University of Messina and is collaborating with several national and international research groups. Prof. Speciale is author of more than 80 publications (research articles, book chapters, and reviews) indexed in PubMed, Scopus, and WoS, mainly in the fields of Pharmacology, Toxicology, Pharmaceutics, Biochemistry and Molecular Biology. Up to November 2024, as downloaded from the Institute for Scientific Information (ISI) he has got 84 (86 Scopus database) papers, 2359 (2608 Scopus database, 4142 Google Scholar) times cited, 2077 without self-citations (2321 Scopus database), with an Average Citation per Item of 28.08 and an H-index of 30 (32 Scopus database, 37 Google Scholar with i10-index of 64).