



Heavy metals in toys and low-cost jewelry: critical review of U.S. and Canadian legislations and recommendations for testing.

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Abstract: High metal contamination in toys and low-cost jewelry is a widespread problem, and metals can become bioavailable, especially via oral pathway due to common child-specific behaviors of mouthing and pica. In this review, the U.S., Canadian, and European Union (EU) legislations on metals in toys and jewelry are evaluated. A literature review on content, bioavailability, children's exposure, and testing of metals in toys and low-cost jewelry is provided. A list of priority metals is presented, and research needs and legislative recommendations are addressed. While the U.S. and Canadian legislations put emphasis on lead exposure prevention, other toxic elements like arsenic and cadmium in toy materials are not regulated except in paint and coatings. The EU legislation is more comprehensive in terms of contaminants and scientific approach. Current toy testing procedures do not fully consider metal bioavailability. In vitro bioaccessibility tests developed and validated for toys and corresponding metal bioaccessibility data in different toy matrices are lacking. The U.S. and Canadian legislations should put more emphasis on metal bioavailability and on other metals in addition to lead. A two-step management approach with mandatory testing of toys for total metal concentrations followed by voluntary bioaccessibility testing could be implemented.

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