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Review Article

Fluorine—A current literature review. An NRC and ATSDR based review of safety standards for exposure to fluorine and fluorides

February 2011, Vol. 21, No. 2 , Pages 103-170 (doi:10.3109/15376516.2010.542931)

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Background: A review of the literature of the element fluorine and its bonded-form, fluoride, was undertaken. Generally regarded as safe, an expanding body of literature reveals that fluoride's toxicity has been unappreciated, un-scrutinized, and hidden for over 70 years. The context for the literature search and review was an environmental climate-change study, which demonstrated widespread fluoride contamination by smokestack emissions from coal-fired electricity-generating plants. The objective of this review is to educate and inform regarding the ubiquitous presence and harmful nature of this now ever-present corrosive and reactive toxin.

Methods: Methods include examination of national health agency reviews, primarily the National Research Council (NRC), Agency for Toxic Substances & Disease Registry (ATSDR), standard medical toxicology references, text books, as well as reports and documents from both private and public research as well as consumer-based NGOs. Study criteria were chosen for relevancy to the subject of the toxicity of fluoride.

Results: Fluoride is the extreme electron scavenger, the most corrosive of all elements, as well as the most-reactive. Fluoride appears to attack living tissues, via several mechanisms. Fluoride renders strong evidence that it is a non-biological chemical, demonstrating no observed beneficial function or role in organic chemistry, beyond use as a pesticide or insecticide. Fluorine has a strong role to play in industry, having been utilized extensively in metals, plastics, paints, aluminium, steel, and uranium production.

Conclusion: Due to its insatiable appetite for calcium, fluorine and fluorides likely represent a form of chemistry that is incompatible with biological tissues and organ system functions. Based on an analysis of the affects of fluoride demonstrated consistently in the literature, safe levels have not been determined nor standardized. Mounting evidence presents conflicting value to its presence in biological settings and applications. Evidence examined in this review of the literature, and specifically the recent report by the National Research Council (NRC), offer strong support for an immediate reconsideration concerning risk vs benefit. Consensus recommendations from several sources are presented.

Keywords

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