

Organic mercury compounds: human exposure and its relevance to public health

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Humans may be exposed to organic forms of mercury by either inhalation, oral, or dermal routes, and the effects of such exposure depend upon both the type of mercury to which exposed and the magnitude of the exposure. In general, the effects of exposure to organic mercury are primarily neurologic, while a host of other organ systems may also be involved, including gastrointestinal, respiratory, hepatic, immune, dermal, and renal. While the primary source of exposure to organic mercury for most populations is the consumption of methylmercury-contaminated fish and shellfish, there are a number of other organomercurials to which humans might be exposed. The antibacterial and antifungal properties of organomercurials have resulted in their long use as topical disinfectants (thimerosal and merbromin) and preservatives in medical preparations (thimerosal) and grain products (both methyl and ethyl mercurials). Phenylmercury has been used in the past in paints, and dialkyl mercurials are still used in some industrial processes and in the calibration of certain analytical laboratory equipment. The effects of exposure to different organic mercurials by different routes of exposure are summarized in this article. *Toxicology and Industrial Health* 2002; **18**: 109–160.

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Introduction

Mercury is a naturally occurring element in the earth's crust. Over geological time, it has been distributed throughout the environment by natural processes, such as volcanic activity, fires, movement of rivers, lakes, and streams, oceanic upwelling, and biological processes. Since the advent of the industrial revolution over 200 years ago, however, anthropogenic sources have become a significant contributor to the environmental distribution of mercury and its compounds.

In the environment, elemental mercury can combine with chlorine, sulfur, phosphorous, and other elements to form inorganic compounds. Primarily through the action of micro-organisms, inorganic mercury can be combined with carbon to form organic mercury compounds, of which methylmercury is the most abundant. In surface waters, it is rapidly accumulated by aquatic organisms, where it biomagnifies as it ascends the food chain.

In addition to methylmercury, there are a number of other organomercurials to which humans might be exposed. The antibacterial and antifungal properties of organomercurials have resulted in their long use as topical disinfectants (thimerosal and

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