

**IS HEXAVALENT CHROMIUM CARCINOGENIC
VIA INGESTION? A WEIGHT-OF-EVIDENCE REVIEW**

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Hexavalent chromium [Cr(VI)] is recognized as a human carcinogen via inhalation, based on elevated rates of lung cancer among occupationally exposed workers in certain industries. Cr(VI) is also genotoxic in bacterial and mammalian cell lines. In contrast, scientific panels in the United States and abroad have reviewed the weight of evidence (WOE) and decided that the available data are insufficient to conclude that Cr(VI) is an oral carcinogen. A criterion of 0.2 ppb was established by a California agency for Cr(VI) in drinking water to prevent cancer, however, this criterion was withdrawn in November, 2001. This criterion was remarkably lower than the promulgated California and federal drinking-water standards for total chromium of 50 ppb and 100 ppb, respectively. Both of the promulgated standards are designed to be protective of humans who ingest Cr(VI). This article describes a WOE analysis to examine the likelihood that Cr(VI) in drinking water poses a cancer hazard at the current U.S. drinking-water standard. The results indicate that: (1) From the historical epidemiological studies, there are a few reports of increased rates of digestive system cancer among Cr(VI)-exposed workers, although most are not statistically significant; (2) the preponderance of evidence from recent epidemiological studies of Cr(VI)-exposed workers does not support an increased risk of cancer outside of the respiratory system; (3) studies of four environmentally exposed populations are negative; (4) there is only one lifetime animal feeding study, and the findings from that study are considered to be flawed and inconclusive; and (5) recent kinetics and in vivo genotoxicity data demonstrate that Cr(VI) is reduced to nontoxic Cr(III) in saliva, in the acidic conditions of the stomach, and in blood. In short, at concentrations at least as high as the current U.S. maximum contaminant level (100 ppb), and probably at least an order of magnitude higher, Cr(VI) is reduced to Cr(III) prior to or upon systemic absorption. The weight of scientific evidence supports that Cr(VI) is not carcinogenic in humans via the oral route of exposure at permissible drinking-water concentrations.