LETTER TO THE EDITOR

Hexavalent Chromium in Texas Drinking Water

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In their Discussion, Collins et al. (2010) derive a lifetime human equivalent daily dose (HED) of 0.166 mg/kg Cr(VI) from the National Toxicology Program’s (NTP) 2-year bioassay report for hexavalent chromium in mice exposed via drinking water. The authors then make incorrect comparisons between this HED value and the highest exposure values obtained from two data sets from Texas and California. Because of the paucity of new data in the paper, we suspect that the choices of the Texas and California data sets were made for the purpose of supporting the claim that the dose range used in the NTP bioassay is representative of current human exposures. In this regard, the lowest bioassay concentration was 5.0 mg/l, nearly two orders of magnitude higher than the maximum contaminant level (MCL) of 0.1 mg/l.

Collins et al. (2010) failed to mention that of the 140 private wells sampled in Midland, only 40 wells had Cr(VI) concentrations above the MCL of 100 ppb and that anion exchange systems had been installed on all 40 wells. The authors also failed to mention that the Texas Department of State Health Services determined that “drinking or bathing with water from wells with elevated chromium and filtration systems is not expected to harm people’s health” (TDSHS, 2009).

TDSHS (2009) does conclude that “exposure to hexavalent chromium could have occurred for more than 1 year” at the West County Road site. The calculation performed by Collins et al. (2010) yielded the human dose for a single day not the lifetime average daily dose that is commonly used in risk assessment. The single-day dose to 5.4 mg/l hexavalent chromium is 0.154 mg/kg obtained by multiplying the concentration by the assumed water intake of 2 l/day and dividing by the assumed body weight of 70 kg.

However, the HED was developed based on a lifetime exposure in the mouse bioassay, and it is not correct to compare this to exposure calculated for a single day (EPA, 1989). Conversations with the resident who owned the private water well measuring 5.4 mg/l indicated that the water was yellow for 3–4 years before notifying TCEQ and had been getting progressively worse. Also, the well water was not used for drinking or cooking for aesthetic reasons prior to installation of the filtration system. If one conservatively assumes that exposure to 5.4 mg/l occurred for 5 years, the lifetime average daily dose would be calculated as follows:

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\frac{5.4 \text{ mg/l} \times 2 \text{ l/day} \times 5 \text{ year} \times 365 \text{ days/year}}{70 \text{ kg} \times 25550 \text{ days/lifetime}} = 0.011 \text{ mg/kg/day.}
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Please note that this value is more than an order of magnitude less than the lifetime HED from Collins et al. (2010). Hence, Collins et al. (2010) misrepresent the difference between lifetime average daily dose and single-day dose (e.g., EPA, 1989, 2005).

Furthermore, no public drinking water system in Texas has exceeded the chromium MCL in the past 5 years. Nearly 26 million Texans are using drinking water with levels of total chromium less than 100 ppb.
REFERENCES


