

Letter to the Editor

**Inorganic Arsenic in Drinking Water and Bladder Cancer: A Meta-Analysis for Dose-Response Assessment**

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In our previous paper, "Inorganic Arsenic in Drinking Water and Bladder Cancer: A Meta-Analysis for Dose-Response Assessment", 2006, 3(4), 316-322, there were several errors in the table of data used in the analysis. In particular:

1. The paper of Bates et al. [1] incorrectly listed units of concentrations. They reported in units of milligrams rather than micrograms (see the last entries in Table 3 of their paper).
2. In the paper by Chiou et al. [2] we introduced an error ourselves. We listed the arsenic exposure level as ≤ 50; 50-70; 71+. These should be ≤ 50; 50-700; 710+.

With these corrections, the pooled estimate of slopes from the seven studies using the fixed effects model becomes was 0.001 (95% CI: 0.001, 0.002), with the unit of lnRR per unit increase of exposure (exposure is in µg/L as in our original paper). The chi-square statistic was quite large (i.e. Q = 497.752 on 6 degrees of freedom, p= 0.00), which rejects the null hypothesis of homogeneity and means there was evidence of heterogeneity. Using the random-effect model, and including only the five studies identified in the original paper as most relevant (excluding Bates et al [1] and Kurttio et al [3]), the pooled estimate of the slopes from the five studies was found to be 0.002 (exposure also in units of per µg/L) (95% CI: -0.001, 0.006).

The new result of the meta-analysis still supports the claim that there is a positive dose-response relationship between exposure to arsenic in drinking water and bladder cancer. Table 1 summarizes the revised results of the absolute risk (AR) calculation for bladder cancer associated with a variety of proposed MCLs (maximum

contaminant levels) using different estimates from the meta-analysis: the best estimate, the upper-bound and lower-bound estimates of the slope factor. The best (revised) estimate of the slope factor from the meta-analysis is  $1.64 \times 10^{-5}$  (with unit of probability per µg/kg/day), with the upper bound of  $5.38 \times 10^{-5}$ . These slope factors from the meta-analysis are lower than the ones from the EPA ( $1.5 \times 10^{-3}$ ) and NRC ( $8.85 \times 10^{-4}$ ).

**Table 1:** Risk of bladder cancer at different MCLs

MCL (ppb)	AR (u_95)	AR (Mean)	AR (L_95)
0	0	0	0
1	-1.80E-07	1.08E-06	-1.80E-07
3	-5.39E-07	3.27E-06	-5.39E-07
5	-8.98E-07	5.48E-06	-8.98E-07
10	-1.79E-06	1.11E-05	-1.79E-06
20	-3.56E-06	2.29E-05	-3.56E-06
50	-8.78E-06	6.30E-05	-8.78E-06

If readers would like the revised figures and tables from the paper, please contact the corresponding author, at the above-referenced address.

## References

1. Bates, M. N.; Rey, O. A.; Biggs, M. L.; Hopenhayn, C.; Moore, L. E.; Kalman, D.; Steinmaus, C.; Smith, A. H.: Case-control study of bladder cancer and exposure to arsenic in Argentina. *Am. J. Epidemiol.*, **2004**, *159*(4): 381-389.
  2. Chiou, H.-Y.; Chiou, S.-T.; Hsu, Y.-H.; Chou, Y.-L.; Tseng, C.-H.; Wei, M.-L.; Chen, C.-J.: Incidence of transitional cell carcinoma and arsenic in drinking water: A follow-up study of 8,102 residents in an arseniasis-endemic area in Northeastern Taiwan. *American Journal of Epidemiology*, **2001**, *153*(5): 411-418.
  3. Kurtio, P.; Pukkala, E.; Kahelin, H.; Auvinen, A.; Pekkanen, J.: Arsenic concentrations in well water and risk of bladder and kidney cancer in Finland. *Environ. Health Perspectives*, **1999**, *107*(9): 705-710.
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