Exposure to Tungsten in Three Nevada Communities
Centers for Disease Control and Prevention Study Results

Background

February 2003 — Results from samples collected in Churchill County as part of a childhood leukemia investigation suggested community-wide elevations of tungsten. Results announced at a public meeting in Fallon, Nevada.

February 13, 2003 — Evaluation of tungsten exposure was begun in three Nevada communities to determine whether the elevated levels of tungsten seen in the Churchill County community were unique. Field researchers traveled to Nevada to collect urine, water, soil, and dust samples.

June 2003 — Results suggest that Churchill County's tungsten exposure is not unique. Results were sent to study participants and released to the Churchill County and other participating communities.

Objective

- To assess the level of exposure to tungsten in three communities of Nevada in order to determine whether the high levels of tungsten found in the urine and water of residents of Churchill County, Nevada, are unique.

Design

- Cross-sectional; we administered questionnaires and collected urine, water, dust, and soil samples to test for tungsten.

Setting

- We sampled the communities of Lovelock, Yerington, and Pahrump, Nevada, on the basis of these cities' hydrogeology and history of tungsten mining.

Findings

Urine Samples

- All three of our study locations had geometric mean[1] levels of urinary tungsten at or above the 95th percentile[2] of the level established by the National Health and Nutrition Examination Survey (NHANES) reference population[3] (0.48 µg/L).
- Yerington's overall urinary tungsten levels were similar to those in Churchill County. Lovelock and Pahrump had levels significantly lower than Churchill County and Yerington.
- Children had consistently higher urinary tungsten levels than adults across all study populations.

Environmental Samples

- The geometric mean for both Lovelock and Pahrump's tungsten levels in water were significantly lower than Churchill County's ($p < 0.0001$),[4] while Yerington's level did not differ significantly from Churchill County's.
- In Lovelock and Pahrump, we found no significant relation between water tungsten levels and urine tungsten levels; we did find a correlation between urine and water tungsten levels in Yerington (Pearson correlation = 0.54; $p < 0.0001$).
- Analysis of the first 60 soil and dust samples identified only six samples with detectable levels of tungsten. Because of the low number of samples with detectable levels of tungsten (10%), no other samples were analyzed.

Geometric Mean Tungsten Levels for Urine and Water Samples

Location	Geometric Mean Tungsten Level (95% confidence interval)			
	Urine (µg/L)			Tap Water (µg/L)
	Adults	Children	Total	
Lovelock	0.38 (0.33-0.45)	0.62 (0.50-0.76)	0.48 (0.34-0.68)	0.11 (0.07-0.19)
Pahrump	0.4 (0.38 - 0.53)	0.56 (0.48 – 0.66)	0.51 (0.37-0.69)	0.04 (0.02-0.06)
Yerington	1.04 (0.84-1.30)	1.18 (1.00-1.39)	1.11 (0.97-1.27)	3.32 (1.82-6.04)
Churchill County	0.81 (0.56 - 1.16)	2.31 (1.66 - 3.22)	1.19 (0.89-1.59)	4.66 (2.98-7.30)
National average[3]	>20 yrs 0.07 (0.07-0.08)	6–11 yrs: 0.15 (0.12-0.18) 12-19 yrs: 0.10 (0.09-0.12)	0.08 (0.07-0.09)	N/A

Conclusions

- Exposure to tungsten in Churchill County does not appear to be unique when compared with other communities in Nevada.
- People living in communities having similar water sources and geologic formations to Churchill County may be expected to have tungsten exposures well above those reported as national reference levels from NHANES.
- Not much is known about the potential effects on health of exposure to tungsten. Upon CDC's recommendation, the National Toxicology Program of the National Institutes of Health currently is reviewing existing literature before beginning toxicologic research of tungsten and tungsten compounds to determine their potential link to cancer in humans.

1 The geometric mean is the measure of the midpoint of a population where the population distribution does not follow a bell-shaped curve.
2 The level at or below which 95% of a study population falls.
3 The *Second National Report on Human Exposure to Environmental Chemicals* (2003) is a national survey of the U.S. population's exposure to 116 chemicals. The report contains reference ranges for these chemicals.
4 $p < 0.0001$ is a measure of the probability that the results are not due to chance alone. The smaller the value, the more likely it is that the results are not due to chance.