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Alaska Hair Mercury Biomonitoring Program Update, July 2002–December 2017

Background

Mercury is a toxic metal that can harm the nervous system of humans, especially developing babies and young children. The primary route by which humans are exposed to mercury is through consumption of fish and selected marine mammal organs (e.g., livers, kidneys).¹ Mercury in a pregnant woman's diet can be transported across the placenta, potentially leading to harmful neurodevelopmental effects on the developing fetus. There is a direct relationship between the amount of mercury present in a person's hair and the amount of mercury in their diet.² In July 2002, the Alaska Section of Epidemiology (SOE) began administering the Alaska Hair Mercury Biomonitoring Program to collect information about exposures to mercury among Alaska women of childbearing age (WCBA; i.e., women aged 15–45 years). The Program offers free and confidential hair mercury testing to WCBA statewide. The hair mercury tests allow women to assess their own mercury exposure and to determine whether dietary or other changes are necessary.

Methods

Hair samples were collected by health care providers or the individuals themselves, and analyzed for mercury by the Alaska State Public Health Laboratory (ASPHL). The instructions for collecting hair samples are available online (see: <http://dhss.alaska.gov/dph/Epi/eph/Pages/biom/default.aspx>). Women with hair mercury concentrations above 5 parts per million (ppm) were contacted by SOE and a follow-up investigation was conducted to help identify and mitigate potential sources of mercury exposure.

Results

During 2002–2017, SOE received hair testing results on 1,281 WCBA (Table). Of these 1,281 women, 346 (27%) were pregnant, 908 (71%) were not pregnant, and 27 (2%) were of unknown pregnancy status. The median hair mercury level was 0.46 (geometric mean 0.43) parts per million (ppm; Figure).

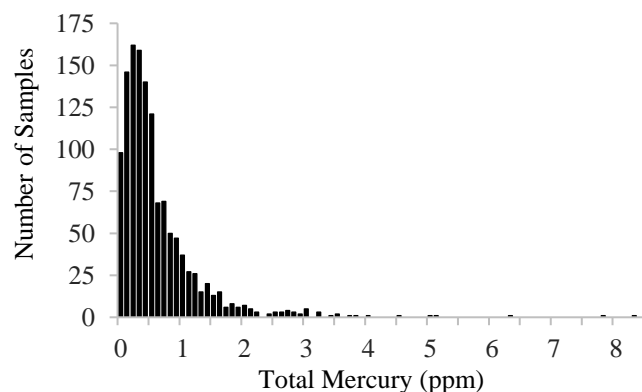
Table. Hair Mercury Concentrations among WCBA (n=1,281) — Alaska, July 2002–December 2017

	Number Tested*	Median Hair Mercury (ppm)	Range (ppm)	Median Age (years)
Total	1,281	0.46	0.01–8.36	30
Pregnant	346	0.39	0.01–6.35	28
Non-pregnant	908	0.48	0.01–8.36	31
Urban	483	0.39 [†]	0.01–3.48	29
Rural	798	0.49 [†]	0.01–8.36	31
Anchorage/Mat-Su	382	0.39	0.01–3.48	29
Gulf Coast	227	0.52	0.01–4.04	32
Interior	119	0.31	0.03–1.99	32
Northern	76	0.49	0.01–2.16	26
Southeast	142	0.46	0.01–3.81	30
Southwest	325	0.58	0.02–8.36	31

*Regional numbers do not sum to 1,281 because 10 patients did not have a region assigned to them. Urban=Anchorage/Mat-Su, Fairbanks area, and Juneau; Rural=all other communities.

[†]Differences in the urban vs. rural median hair mercury values are small but statistically significant ($P<0.05$).

Figure. Hair Mercury Concentrations among WCBA (N=1,281) — Alaska, July 2002–October 2017



Hair Mercury Levels ≥ 5 ppm

During 2002–2017, SOE received reports of 11 women with hair mercury levels ≥ 5 ppm; four were WCBA and seven were aged >45 years, and all 11 were from the Southwest region. Follow-up investigations revealed regular consumption of freshwater pike and/or marine mammal organs, both of which are known to potentially contain high levels of mercury.¹

Discussion

The hair mercury biomonitoring results presented here continue to suggest that women in Alaska are exposed to relatively low levels of dietary mercury. Overall, the Alaska Hair Mercury Biomonitoring Program has been instrumental in providing reassurance to Alaskans about the safety of consuming Alaska fish. Fish is an excellent source of protein and omega-3 fatty acids, and when consumed by pregnant and lactating women, contributes to the healthy development of fetuses and young children. Salmon remains the most consumed fish in Alaska and all five species are recommended for consumption in unlimited amounts due to their low mercury content.¹

The mercury hair test is cost-free to patients and it takes about 2 minutes to administer. It consists of cutting a small piece of hair from the back of the patient's head, placing it in a labeled zip-lock bag, then sending it to ASPHL in a pre-addressed envelope. Patients and clinicians receive the results by mail within a month of sample submission.

Recommendations

1. Alaskans should continue to follow the Alaska Division of Public Health fish consumption guidelines, which were updated in 2014 (statewide guidelines) and 2016 (regional guidelines specific to pike and burbot).^{1,3}
2. Health care providers should encourage WCBA, especially pregnant women, to participate in the Alaska Hair Mercury Biomonitoring Program to learn whether dietary changes are necessary to reduce their mercury exposure.
3. For more information about the Alaska Statewide Maternal Hair Biomonitoring Program, including how to collect hair samples and request testing kits, go to: <http://dhss.alaska.gov/dph/Epi/eph/Pages/biom/default.aspx>

References

1. SOE. Fish Consumption Advice for Alaskans. 2014. Available at: <http://epibulletins.dhss.alaska.gov/Document/Display?DocumentId=60>
2. Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological profile for Mercury. 1999. Available at: <https://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=115&tid=24>
3. Alaska Epidemiology Recommendations and Reports. "Pike and Burbot (Lush) in Select Alaska Rivers: Mercury Exposure and Consumption Recommendations". No. 18(1), July 19, 2016. Available at: http://www.epi.alaska.gov/bulletins/docs/rr2016_1.pdf