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Adult Human Biomonitoring Results in Old Crow, YT

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Introduction

A **contaminant and nutrient biomonitoring study** was conducted in Old Crow, Yukon Territory (YT). Old Crow is a primarily Gwich'in community of approximately 245 people that is fly-in access only. Traditional food, including caribou, moose and fish, are an important part of the diet of community members, however recent studies have found elevated concentrations of some contaminants, including Cd and Hg, in some of these foods. This project was initiated, in part, to **address the concerns of community members regarding contaminant exposure levels, and possible exposure sources.**

This is also the **first comprehensive human biomonitoring project conducted in the Yukon**. The results of this study can be used as a tool to evaluate the universality of patterns observed in national-scale biomonitoring projects in Canada, which do not include participants from northern communities.

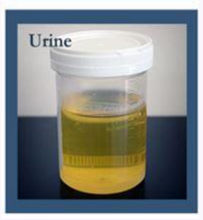
Methods

Project Initiation and Recruitment

Community Partnerships: This project was initiated in 2016 at the request of the Vuntut Gwitchin Government after elevated concentrations of some contaminants (e.g. Cd, Hg) were found in some traditional foods.

Population and Recruitment: The clinic was open to community members over the age of 4. Random recruitment was conducted by phone, and passive recruitment was conducted by word-of-mouth, local media, and posters.

Biomonitoring Sampling and Data Analysis



Sample Collection: Samples of hair, blood, and urine were collected from participants, and analyzed for the following parameters:

- Metals in whole blood and urine
- Mercury in hair
- Persistent Organic Pollutants (POPs) in plasma
- Omega-3 fatty acids in plasma
- Perfluorinated alkyl substances (PFASs) in serum

Data Analysis and Interpretation: Geometric means (GM) and 95th percentiles (95P) with 95% confidence intervals were calculated for each parameter. Results were compared to the Canadian Health Measures Survey (CHMS) and the First Nations Biomonitoring Initiative (FNBI).

Return of Results

Results were returned to the community in February 2020 in both plain language and technical reports, a community meeting presentation, media outreach, and individual results letters returned in one-on-one meetings.

Results

Participation

Table 1: Participant Demographics

Sample Type	Age		Sex	
	Group	n	Group	n
Blood	18 – 39	26	Male	26
	40 – 59	18	Female	28
	60+	10		
Urine	18 – 39	22	Male	22
	40 – 59	16	Female	25
	60+	9		
Hair	18 – 39	32	Male	31
	40 – 59	22		
	60+	17	Female	40

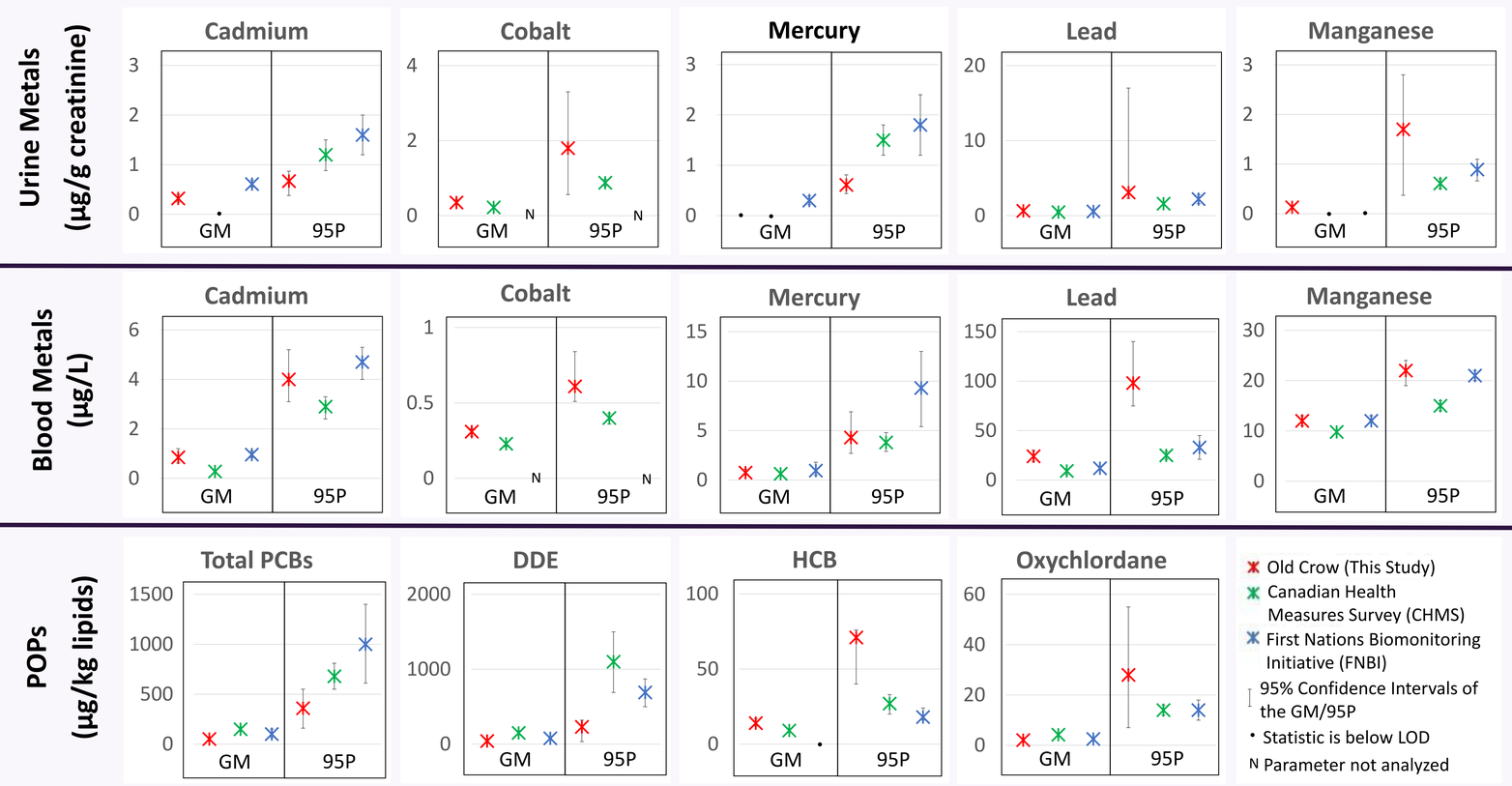
44% of eligible residents (77 of 175 adults) took part in at least one component of the clinic.

Comparison to Health-Based Guidance Values

Table 2: Percentage of Participants (n=77) in Old Crow Exceeding Selected Health-Based Guidance Values (HBGVs)

		Men >18 Years		Women 18-49 Years		Women >50 Years	
		HBGV	% Exceeding	HBGV	% Exceeding	HBGV	% Exceeding
Blood	Sample Size	n=26		n=17		n=11	
	Mercury	20 µg/L	0	8 µg/L	0	20 µg/L	0
	Lead	100 µg/L	3.8	50 µg/L	5.9	100 µg/L	9.1
	Cadmium	5 µg/L	3.8	5 µg/L	0	5 µg/L	0
Urine	Sample Size	n=21		n=15		n=8	
	Mercury	25 µg/L	0	25 µg/L	0	25 µg/L	0
	Lead	7 µg/L	0	7 µg/L	0	7 µg/L	0
	Cadmium	7.3 µg/L	0	7.3 µg/L	0	7.3 µg/L	0
Hair	Sample Size	n=31		n=23		n=17	
	Mercury	5 µg/g hair	0	2 µg/g hair	0	5 µg/g hair	0

Select Biomarker Concentrations



Omega 3 Fatty Acids: The GM of EPA+DHA/total of fatty acids is 1.9% These are similar to those from recent summary of studies in Canada (1.5 - 2.4% EPA+DHA as a total of plasma fatty acids).

Discussion and Conclusions

- **All participants' exposure levels were below the biomonitoring guidance values for mercury, and most participants levels were below the guidance values for cadmium and lead**
- The majority of nutrient biomarkers, contaminant biomarkers, including toxic metals such as cadmium, uranium, and mercury, as well as POPs, such as PCBs, and organochlorine pesticides, were **similar to those observed in the general population of Canada and other First Nations communities.**
- Some contaminants, including mercury, were lower in Old Crow than those observed in other northern Canadian communities, while others, including lead and POPs, were observed at similar concentrations.
- Key exceptions include **lead, cobalt, manganese, and hexachlorobenzene**, which appeared at elevated levels. These parameters have been identified as priority substances for future work to identify determinants and sources of exposure in the community
- Generally, the results of the biomonitoring work in Old Crow support the conclusion that **the benefits of consuming traditional foods, such as wild fish and game, outweigh the risk of contaminant exposure for this community.**

Article Reference

This poster is a summary of the following peer-reviewed paper: Drysdale M, Ratelle M, Skinner K, Garcia-Barrios J, Gamberg M, Williams M, et al. Human biomonitoring results of contaminant and nutrient biomarkers in Old Crow, Yukon, Canada. Science of the Total Environment. 2021;760(15).

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