EXAMINATION OF DIETARY EXPOSURE TO POLYFLUORINATED COMPOUNDS VIA CONSUMPTION OF SOME TRADITIONAL FOODS

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INTRODUCTION

the routes of human exposure to perfluorinated compounds (PFCs) have not been well-characterized
one possible route of human exposure is the consumption of foods containing PFCs
past work on PFCs in Arctic biota has shown that these compounds are present in the Arctic environment
this initial study was performed to examine the dietary exposure of traditional food consumers to PFCs

MATERIALS AND METHODS

liver samples (n=20) were collected from various locations in Nunavut, Canada between 1997 and 1999
samples were analyzed using a methanolic extraction method and LC-MS/MS [Tomy et al. 2005] for perfluorocarboxylates (PFOA through PFDoDA), one perfluorosulfonate (PFOS), perfluorosulfonamides (PFOSA, N-MePFOSA, N-EtPFOSA), and unsaturated telomer acids (6:2 through 10:2 FTUCA)
isotopically labelled compounds were used as recovery and instrument performance internal standards to correct for losses during sample processing and matrix effects, respectively

RESULTS AND DISCUSSION

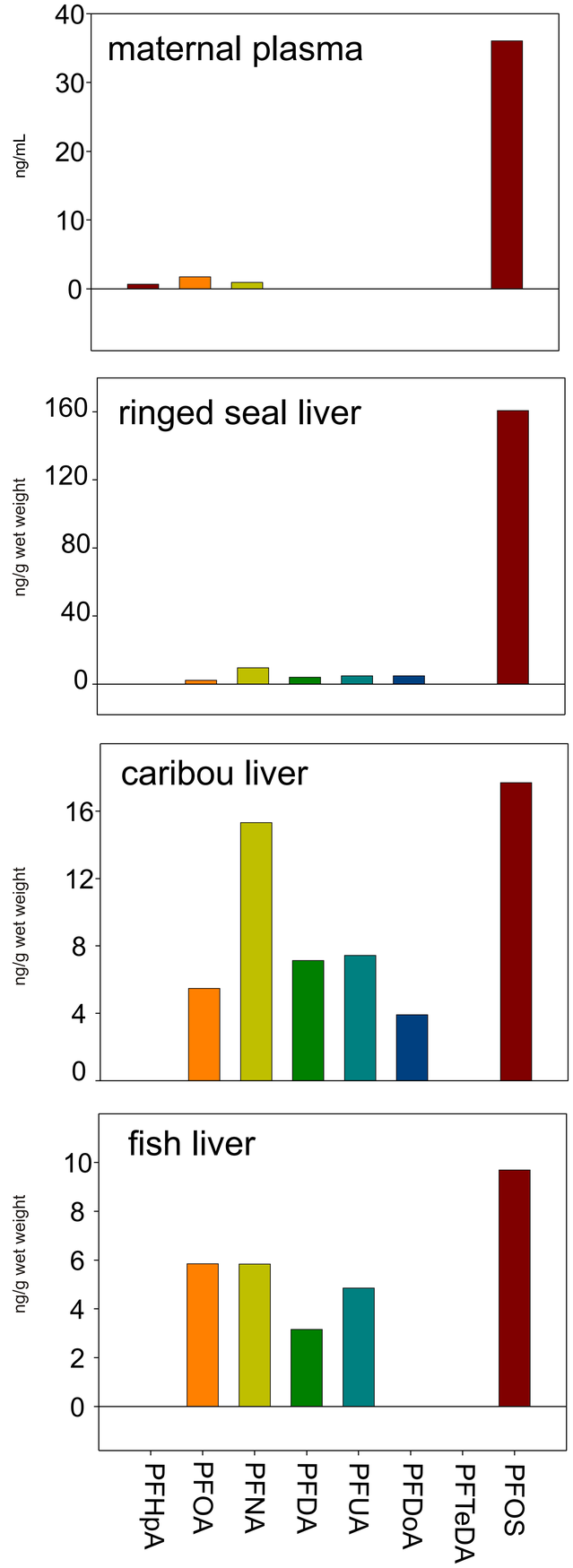
Table 1 lists concentrations of PFCs observed in the liver samples
N-MePFOSA, 6:2 FTUCA, 8:2 FTUCA, and 10:2 FTUCA were not detected in any of the samples
PFC concentrations observed are similar to those previously reported for ringed seal, walrus, and fish liver sampled from the Canadian Arctic [Martin et al. 2004, Tomy et al. 2004]
relative concentrations of PFAs (Figure 1) are different from those observed in plasma of traditional food consumers [Tittlemier et al. 2004]
perfluorocarboxylates with perfluoroalkyl chains > C9 were not observed in human plasma, but were found in almost all samples analyzed

Table 1. Liver perfluorinated sulfonate, carboxylate, and sulfonamide concentrations (ng/g, wet weight)

Species	Community	Preparation	PFOA	PFNA	PFOS	PFDA	PFUA	PFDoDA	PFAs	PFOSA	N-EtPFOSA	PFOSAs
Arctic char	Kugluktuk	Raw	nd[a]	nd	5.4	nd	nd	nd	5.4	1.6	151	152.6
Burbot	Aklavik	Raw	26.5	29.2	2.7	10.2	nd	nd	68.6	nd	nd	nd
Burbot	Aklavik	Raw	nd	nd	15.4	nd	nd	nd	15.4	nd	nd	nd
Burbot	Aklavik	Raw	nd	nd	18.3	nd	nd	nd	18.3	nd	nd	nd
Burbot	AklavikJackfish Creek	Raw	2.7	nd	6.7	5.6	24.3	nd	39.3	nd	nd	nd
Caribou	Pond Inlet	Raw	8.9	26.3	19.8	12.8	7.6	10.8	86.3	nd	nd	nd
Caribou	pooled	Baked	2.1	24.6	19.7	7.8	4.9	6.4	65.5	nd	nd	nd
Caribou	Hopedale	Raw	12.2	17.8	24.4	14.5	11.6	nd	80.5	nd	nd	nd
Caribou	Pond Inlet	Raw	5.9	15.5	15.2	4.5	3.9	6.2	51.3	nd	nd	nd
Caribou	Pond Inlet	Raw	3.7	7.7	23.2	nd	10.7	nd	45.3	nd	nd	nd
Caribou	Kugluktuk	Raw	nd	nd	3.8	3.2	5.9	nd	12.9	nd	nd	nd
Ringed seal	Igloolik	Raw	nd	25.2	86.7	4.4	5.6	2.9	124.7	nd	nd	nd
Ringed seal	Igloolik	Raw	8.7	6.2	74.3	4.2	9.0	nd	102.5	0.4	nd	0.4
Ringed seal	Qikiqtarjuaq	Raw	nd	7.1	152.8	3.3	4.9	7.5	175.6	1.6	nd	1.6
Ringed seal	Igloolik	Raw	2.3	nd	291.7	0.7	4.6	13.6	312.9	0.2	nd	0.2
Ringed seal	Igloolik	Raw	nd	9.0	197.9	7.1	nd	nd	214.1	2.8	nd	2.8
Walrus	Igloolik	Raw	5.8	18.0	27.7	6.4	3.8	11.1	72.6	3.1	nd	3.1
Walrus	Igloolik	Raw	0.3	22.3	38.6	2.7	1.8	4.7	70.6	3.3	nd	3.3
Walrus	Igloolik	Raw	4.5	34.9	8.1	3.5	4.7	4.5	60.2	0.6	nd	0.6
Walrus	Igloolik	Raw	nd	11.1	14.6	nd	4.8	8.8	39.3	1.1	nd	1.1

[a]not detected above method detection limits

Figure 1. Concentrationso f various PFCs in traditional food samples and plasma of traditional food consumers



CONCLUSIONS

liver from species listed in Table 1 is a dietary source of perfluorocarboxylates, PFOS, and some perfluorosulfonamides
consumption of ringed seal liver will lead to the greatest dietary exposure to PFCs
however, since liver is not one of the main traditional food items consumed, a wider variety of food items must be analyzed to obtain a better picture of the dietary exposure of traditional food consumers to PFCs

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REFERENCES

Martin JW; Smithwick MM; Braune BM; Hoekstra PF; Muir DCG; Mabury SA. *Environ.Sci.Technol.* **2004,** *38*, 373-80.
Tittlemier SA; Ryan JJ; Van Oostdam J. *Org.Comp.* **2004,** *64*, 4009-14.
Tomy GT; Budakowski WR; Halldorson T; Helm P; Stern GA; Friesen K; Pepper K; Tittlemier SA; Fisk AT *Environ.Sci.Technol.* **2004,** *38*, 6475-81.
Tomy G; Halldorson T; Tittlemier SA. 25th International Symposium on Halogenated Environmental Organic Pollutants and POPs, Aug. 21-26, 2005.