Biomarkers of Human Health Risk in the Hudson River

The Hudson River Anglers Health Study
(Pilot Study 1999-2000)

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The Hudson River Anglers Health Study

- Enlist the help of local angler groups and community organizations to enroll 50 Anglers who fish recreationally in the lower Hudson River or in the NY-NJ harbor

- Determine whether the harmful environmental pollutants that are elevated in the sediments and edible species from the river or harbor are also elevated in anglers who eat locally caught fish and crabs

The Hudson River Anglers Health Study

Exposure Assessment

- Blood sample and hair sample

- Structured questionnaire
  - Detailed information on location, preparation, cooking and consumption of specific species of fish and crabs; demographic characteristics

The Hudson River Anglers Health Study

Exposure Assessment

- Levels of PCBs in serum
- Levels of pesticides in serum (chlordane, DDT, DDE)
- Levels of mercury in hair and whole blood
- Self-reported frequency, amount, and type of fish and crabs consumed

Table 2. The Hudson River Anglers Health Study Population

Characteristic		N (%)
Recruitment Site	Stony Point, NY (HRAA)	22 (48%)
	Ridgefield Park, NJ (HRFA-NJ)	21 (46%)
	Elizabeth, NJ	3 (6%)
Age (years)	≤ 40	11 (24%)
	41 – 50	13 (28%)
	51 – 60	15 (33%)
	≥ 61	7 (15%)
Gender	Male	43 (93%)
	Female	3 (7%)
Race	White	42 (91%)
	Black	4 (9%)

Table 2b. Frequency of Locally-Caught Fish and Shellfish Consumption in the Anglers Health Study Population

Characteristic		N (%)
Frequency of *Any* Local Fish or Shellfish Consumption	Never	2 (4%)
	< 1 meal/month	5 (11%)
	1 - 4 meals/month	17 (37%)
	2 - 6 meals/week	21 (46%)
	> 6 meals/week	1 (2%)
Frequency of Local *Striped Bass* Consumption	Never	9 (20%)
	< 1 meal/month	10 (22%)
	1 - 2 meals/month	16 (35%)
	3 - 4 meals/month	8 (17%)
	≥ 2 - 3 meals/week	3 (6%)
Frequency of Local *Blue Crab* Consumption	Never	20 (43%)
	< 1 meal/month	6 (13%)
	1 - 2 meals/month	10 (22%)
	3 - 4 meals/month	4 (9%)
	≥ 2 - 3 meals/week	6 (13%)

Table 3. Exposure Levels of Persistent Pollutants in the Anglers Health Study Population

Pollutant	All Anglers (n=37)		New Jersey Anglers (n=19)	New York Anglers (n=15)
	[a]Mean ± SD	Range	Mean	Mean
Total Low PCB congeners (ng/ml)	1.11 ± 1.67	(0.48 – 6.63)	1.40*	0.85
Total High PCB congeners (ng/ml)	4.70 ± 1.79	(1.83– 16.88)	5.17	4.74
Chlordane residues (ng/ml)	0.91 ± 1.93	(0.33 – 4.72)	0.99	0.90
p,p´- DDT (ng/ml)	0.60 ± 1.37	(0.37 – 2.54)	0.66	0.54
p,p´- DDE (ng/ml)	4.82 ± 2.82	(0.83 – 57.80)	5.77	4.59
Total Mercury in blood (ng/mL)	2.82 ± 4.79	(0 – 22)	4.17	2.53
Total Mercury in hair (μg/g)	1.52 ± 1.25	(0.17 – 6.18)	---	---

[a]Geometric mean ± standard deviation

*p-value < 0.05 for Student's t-test comparing age-adjusted least-squares geometric means for New Jersey club anglers versus New York club anglers. 3 anglers from a community center not included in comparison.

Figure 1. **Average level of environmental pollutants in blood, by frequency of locally-caught fish or crab consumption**

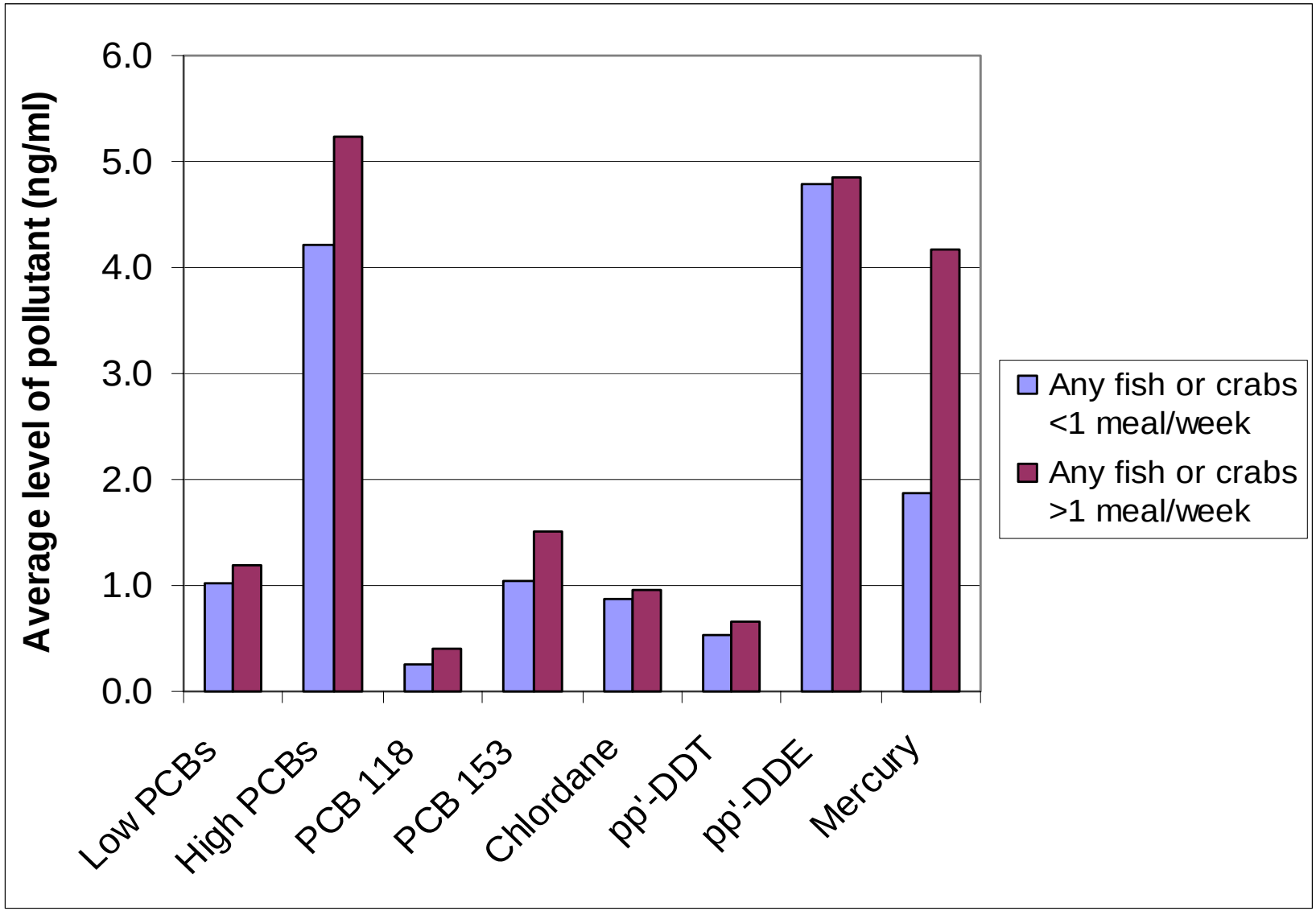
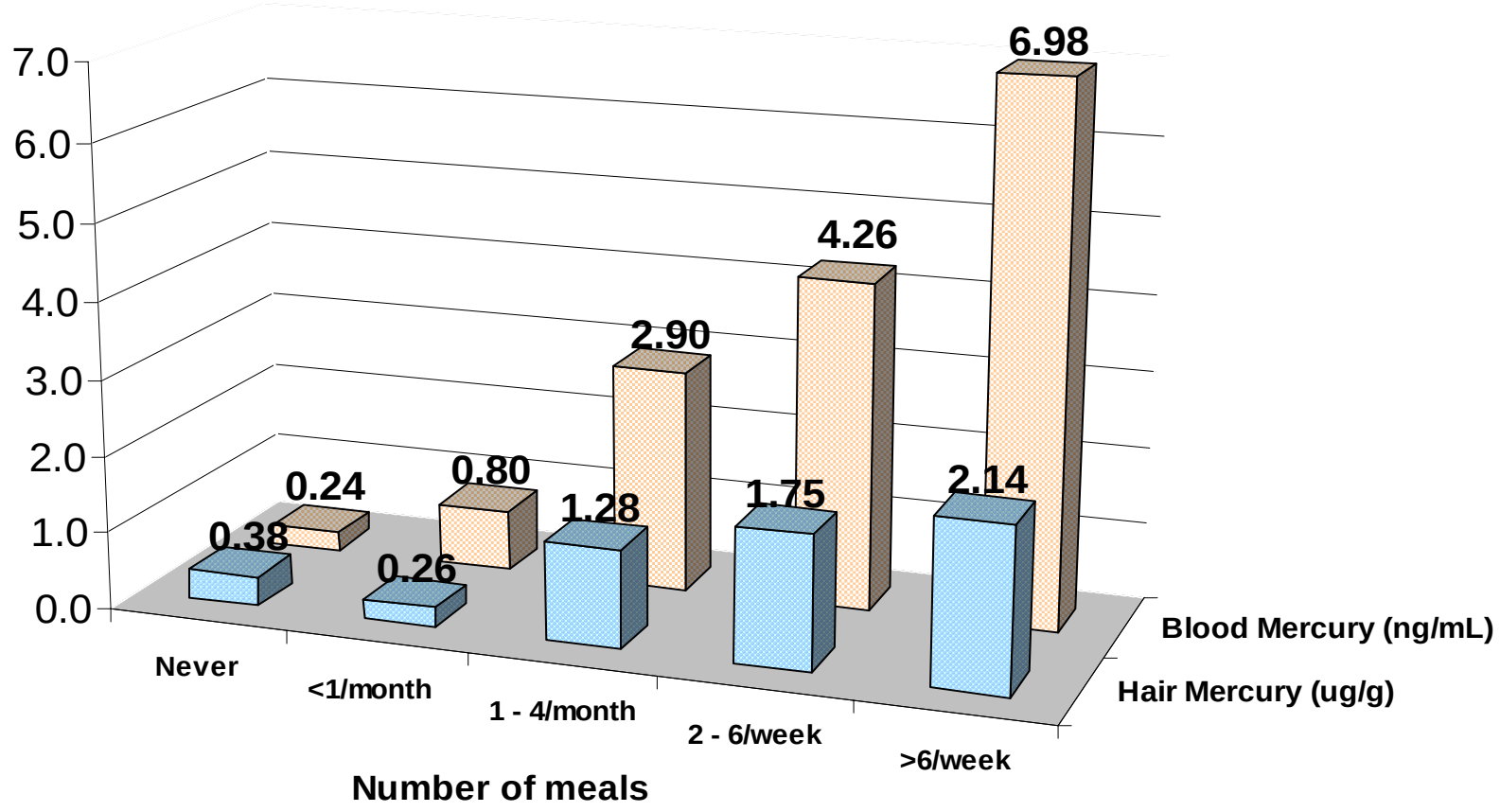


Figure 6. Exposure-response gradient for mercury levels in blood and hair with increasing fish or crab consumption



The Hudson River Anglers Health Study

Study Results

1. Anglers who frequently eat locally caught fish or crabs (one meal per week or more) have the highest body burdens of persistent, bioaccumulative environmental pollutants.

2. Among the consumers, increasing “exposure - response” relationships are observed between the frequency of consuming fish or crabs and the body burden of environmental pollutants.