Mortality among frequent consumers of Great Lake sport fish

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Background

- Fish consumption has been associated with a reduced risk of heart disease
- Bioaccumulative toxins found in Great Lake fish (PCBs, DDE and mercury) have been linked to cancer, neurological and cardiovascular diseases.
- A cohort of nearly 4,000 residents of the Great Lakes Basin was used to evaluate the impact of local fish consumption on cause-specific mortality rates.

Study Questions

- How does long-term ingestion of sport fish from the Great Lakes affect human longevity?
  - Is it protective against cardiovascular diseases?
  - Do contaminants in these fish increase cancer risk?
  - Do frequent consumers of these fish live longer than others?

Study Population

- Frequent Consumers - 2,538 Great Lake charterboat captains and 180 Wisconsin anglers
- Infrequent Consumers - 1,141 referents
- Cohort assembled between 1993 and 1994 and followed from 1995 to 2006.
- Approximately 30% women.
- Follow-up provided 44,465 person-years at risk of death.
- Mean age of cohort was 57.5 yrs at end of our study.

Referent Population

- Referents lived in the same communities but could not have eaten any GL fish and no more than 6 sportfish meals in any of the previous 10 years. They were recruited by a random digit dial telephone survey.

Mean serum PCB Levels (µg/L) 1995

	No fish meals per month		
	0-1	>1 and <4	≥ 4
Captains	3.6	4.7	6.2
Referents	2.9	1.7	2.4

Study Methods

- National Death Index was used to identify deaths.
- Records were matched using:
  - Name (First, Last and MI)
  - Birth date (mm/dd/year)
  - Last known address (street address, cvt, state, zip)
  - Sex
  - Race
- Exact matches were made for 279 cohort members.
- 63 fuzzy matches were verified providing a total of 342 deaths.

Findings

- The leading causes of death were cancer (134) and cardiovascular disease (109).
- ≥ 1 fish meal/week was protective against all cause, CVD and CHD mortality in referents
- Fish intake was not protective among captains.
- 1 yr increase in age was associated with a 10% increase in mortality

Top 5 Causes of Death
Age-Adjusted Rates per 100,000

Cause	Midwest US	Captains	Referents
Cardiovascular disease	606.1	397.4	465.7
Cancer	389.8	394.8	378.6
Resp. Disease	156.0	89.5	96.6
CNS Disease	73.1	51.0	23.7
External Causes	71.8	52.9	49.9
All causes	1572.0	1103.7	1205.4

All Cause Mortality vs Fish Intake

Fish intake	Captains		Referents	
	#	RR	#	RR
0-1/month	24	1.00	70	1.00
>1/month & <1/week	66	1.14	29	0.76
≥ 1/week	87	1.00	29	0.60*

* Significant at p<0.05

Cardiovascular Disease vs Fish Intake

	Captains (N=2,123)		Referents (N=1,367)	
Fish Intake	#	RR	#	RR
0-1.0/month	7	1.00	26	1.00
1.1-4/month	17	0.94	8	0.56
≥1 per week	27	0.97	10	0.45*

*significant at p<0.05

Coronary Heart Disease vs Fish Intake in Men only

	Captains (N=1,609)		Referents (N=940)	
Fish Intake	#	RR	#	RR
0-1.0/month	3	1.00	16	1.00
1.1-4/month	11	1.48	6	0.74
≥1 per week	20	1.81	4	0.31*

*** Significant at p<0.05**

Cancer Mortality vs Fish Intake

	Captains (N=1,609)		Referents (N=940)	
Fish Intake	#	RR	#	RR
0-1.0/month	11	1.00	22	1.00
1.1 - 4/month	26	0.99	12	0.99
≥1 per week	40	1.02	10	0.73

Cancers to Watch

- Pancreatic – 6 of 8 occurred in captains
- Brain – 5 of 6 occurred in captains
- Female breast, ovary and uterus – 5 of 6 occurred in the captain group
- Soft tissue sarcoma – 2 of 2 in the captain group

Conclusion #1

Overall death rate is lower in our cohort compared to the general population.

We concluded this was likely to due to a difference in the age distribution of our cohort vs the general population with fewer people over the age of 70 yrs in our cohort (6% vs 19%).

Conclusion #2

- Weekly fish ingestion is associated with lower cardiovascular and coronary heart disease death rates in our referent population, but not in our captain group.
  - This suggests that ingestion of marine fish, but not local fish, is providing a beneficial effect OR that our captains have other risk factors that were not controlled for in our analysis.

Conclusion #3

- Moderate to high fish intake was associated with a non-significant increased rate of coronary heart disease death in captains.
  - This is of interest because we have observed elevated methylmercury levels among older men who eat local fish several times a month.

Conclusion #4

- No significant associations were seen between fish intake and cancer death rates. However, our numbers for individual cancer types were small.

- Cancers of the brain and pancreas, female breast, ovary and uterus were more common among frequent consumers of Great Lake fish.

Recommendations

These findings are preliminary. We will continue to track mortality in this cohort. Future studies will focus on cardiovascular and cerebrovascular disease as well as cancer deaths and overall longevity.

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- Reference: Tomasallo C., Anderson H, Haughwout ML, Imm P and Knobeloch L. Mortality among frequent consumers of Great Lakes sportfish. Env Research. 110:62-60, 2010.


Thank you!
Questions?