

Toxic Tuna

Mercury Contamination In Chicago Restaurant Tuna Sushi



August 2006

Got Mercury?

A Project of Turtle Island Restoration Network



GotMercury.Org
PO Box 400
Forest Knolls, CA 94933
<http://GotMercury.Org>
Contact: Eli Saddler, Public Health Analyst
eli@GotMercury.Org, 415-488-0370, ext. 104

Environment Illinois
407 S. Dearborn St., Suite. 701
Chicago, IL 60605
<http://EnvironmentIllinois.org>
Contact: Max Muller, Environmental Advocate
max@environmentillinois.org, 312-291-0696, ext. 211

Toxic Tuna: Mercury Contamination In Chicago Restaurant Tuna Sushi

Contents

Executive Summary	2
Introduction	4
Methodology	5
Types of Sushi	6
Species of Tuna	7
Findings: Mercury Concentrations in Chicago Restaurant Tuna Sushi .	8
Policy Recommendations	10
Appendix A: The FDA Fish-Mercury Advisory	13
Appendix B: The California Fish-Mercury Advisory	14
Appendix C: Benihana's Fish-Mercury Advisory	15
Endnotes	16

Executive Summary

Methylmercury is a neurotoxin especially dangerous to developing fetuses and young children. GotMercury.Org and Environment Illinois tested mercury concentrations in twenty tuna sushi samples from ten high-rated Chicago sushi restaurants.

Key Findings:

- The mean mercury concentration of the Chicago-area tuna sushi samples studied was 0.446 parts per million (ppm) total mercury—close to the 0.50 ppm legal limit in Canada and the European Union.
- Of the 20 samples tested, 14, or 70 percent, exceeded the Illinois Environmental Protection Agency's (IEPA) special advisory threshold for methylmercury. The special advisory threshold, designed to give guidance to Illinois anglers who eat their catch, is the mercury contamination level at which the agency recommends women of childbearing age and children eat no more than one meal of fish per month.
- One in seven of the samples were unsafe for women and children to eat at all because their mercury concentration exceeded 0.730 ppm, the average of king mackerel, which the U.S. Food and Drug Administration (FDA) tells pregnant or nursing mothers, women of childbearing age, and children never to eat.
- Of these, two (10 percent) of the tuna samples were unsafe for *all* consumers because they exceeded the FDA action level of 1.0 ppm. The action level is the legal limit for fish sold in the United States; when fish exceed the action level, the FDA is empowered to remove them from the retail market.

These findings suggest that members of sensitive populations, such as children, pregnant or nursing mothers, and women in their childbearing years who might become pregnant, should not eat tuna sushi. In addition, based on these findings, we recommend the following changes in policy:

Policy Recommendations:

1. Restaurants and stores that sell tuna sushi, sashimi, and *ahi* should post clear and concise mercury advisories so that consumers may make informed choices about what to eat.
2. The FDA should update its fish consumption advisory for sensitive populations to recommend that they do not eat tuna. The FDA should also require restaurants and supermarkets to post its mercury advisory.

The FDA currently warns women of childbearing age and children that they should not eat king mackerel, (average mercury concentration: 0.730 ppm), swordfish (0.97 ppm), shark (0.988 ppm), and tilefish (1.45 ppm).¹ Because tuna sushi often contains as much mercury as king mackerel, the FDA should recommend that sensitive populations avoid tuna altogether.

3. FDA should collect more data about mercury concentrations in fish and pull fish from the market when their mercury concentration exceeds the 1ppm action level.

4. In the absence of federal leadership, state and local governments should take the initiative to require point-of-sale mercury advisories.
5. Federal, state, and local governments should enact policies to reduce mercury pollution at the source, which could ultimately lead to a reduced risk of mercury exposure from fish and a healthier public.

Introduction

Mercury is a naturally occurring element present in the earth's rocks and soils where it remains sequestered and generally biologically unavailable until disturbances cause it to be emitted into the environment. One study estimated that in 1990 about 30% of mercury emissions were caused by natural processes such as the weathering of rock containing mercury, and 70% were caused by human activities such as the burning of mercury-containing coal.²

When mercury emissions land in waterways, bacteria transform it into methylmercury, which is both bioaccumulative and a potent neurotoxin. The National Academy of Science reported that consumption of mercury-contaminated fish is the dominant source of mercury exposure in humans.³ Even low-level mercury exposure can be dangerous, especially to sensitive populations such as women who are nursing, pregnant, or of child bearing age, and children. Moreover, dangerous levels of mercury exposure are widespread in the United States. In April 2004, U.S. Environmental Protection Agency (EPA) scientists estimated that up to one in six women of childbearing age in the U.S. has a sufficiently high mercury blood level to put 630,000 of the four million American babies born each year at risk of neurological damage.⁴

Fish highest in the food chain, such as long-lived predatory species like tuna and swordfish, build up the highest levels of mercury through bioaccumulation. Recognizing this danger, the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA) issued a joint mercury-in-seafood advisory to children and women of childbearing age in March 2004.⁵ The federal mercury advisory tells women of childbearing age and children to limit their consumption of tuna and to eliminate four other species of fish from their diets.



Ample scientific data indicate that mercury causes neurodevelopmental impairments. Exposed children show symptoms that “include poor performance on neurobehavioral tests, particularly on tests of attention, fine motor function, language, visual-spatial abilities (e.g., drawing), and verbal memory.”⁶ A recent Harvard study found that “higher mercury exposure in pregnancy is associated with lower offspring cognitive scores, even at these relatively low levels of exposure.”⁷ Studies have even shown links between cardiovascular disease in adults and the consumption of large volumes of fish high in mercury.⁸

It is clear that because mercury is both toxic and accumulative it should be avoided whenever possible. To choose foods wisely, consumers need to know which fish are low in mercury. It is not necessary to eat tuna to get the health benefits associated with seafood consumption. Sushi lovers should not give up seafood, but should instead find the healthiest alternatives that are high in omega-3 fatty acids and low in mercury.

Methodology

This study focuses on mercury in tuna sushi. Sushi is currently one of the most popular foods for eating out in the United States. According to the 2006 *Zagat Survey*, “sushi restaurants lead the Top Food and/or Most Popular lists” in nearly all cities.⁹ It is worth noting that while many of these highly-ranked restaurants post signs showing their *Zagat* ratings, few outside of California post visible advisory of the mercury content of the fish they sell.

Sushi samples were collected between March 31 and April 5, 2006 from the five Chicago Japanese restaurants most highly rated in *Zagat Survey*. Additionally, samples were collected from five Chicago-area restaurants owned by Benihana Corporation, which claims to be the largest restaurant chain in the U.S. to serve sushi.¹

When possible, two different tuna sushi were collected at each restaurant. One sushi was typically *nigiri* (fish on top of rice) and usually listed as *maguro* or tuna. The other sample was typically a tuna roll, or *makizushi*. In all cases, restaurant staff members were asked what species of tuna was being served.²

A laboratory at Rutgers University performed the mercury analysis. The analyses were performed twice, on two different atomic absorption spectrometers, one manufactured by Lumex and one by PerkinElmer. The averages of the two analyses were used in this report.



The tests performed at Rutgers detect total mercury rather than methylmercury specifically, but research has shown that nearly 100% of mercury that bioaccumulates in fish is methylated.¹⁰

¹ GotMercury.Org chose restaurants owned by Benihana for this study because, at the time the data was collected, GotMercury.Org was leading consumer campaign urging Benihana to post mercury advisories for patrons outside of California. Benihana agreed to a consent decree to post mercury advisories at its California locations. In the time since the data was collect, Benihana has begun posting mercury advisories in its restaurants outside of California, including in Chicago.

However, GotMerucury.Org regards Benihana's currently posted mercury consumption advisory as insufficient to educate consumers adequately. See the appendixes to compare the consumption advisories Benihana is required to post in California with the signs it has voluntarily posted in Illinois. The California signs are much clearer and better reflect prudent public health precautions regarding mercury in seafood. GotMercury.Org and its members continue to urge Benihana and other restaurants to model their consumption advisories after the California signs.

² Tuna sample species were recorded as indicated by the restaurant staff. It is not possible to confirm tuna species with the analytic methods employed in this study. Reported species cannot be guaranteed to be accurate for the following reasons: 1) Bluefin may be over-reported, as it is the most desirable species, 2) in some instances staff indicated a lack of certainty about the species, and 3) in some instances there existed a language barrier to clear communication.

Types of Sushi

Sushi is traditionally served *nigiri* style (or *nigirizushi* in Japanese) in which is rice covered with fish or shellfish and served in pairs, or *maki* style (*makizushi* in Japanese) in which is rice rolled around a center of fish or shellfish and sometimes other ingredients. There are other types of sushi, but these are the most common and most familiar to sushi lovers in the United States.

Almost all sushi restaurants in the U.S. carry tuna sushi. *Nigirizushi* often comes labeled as either *toro* or *maguro*, referring to what part of the fish it comes from. *Toro* refers to fatty tuna from the belly of the fish and is the most prized. *Maguro* refers generally to cuts of tuna from elsewhere on the fish.

Sashimi, another popular dish at Japanese restaurants, is simply a slice of top-grade raw fish served alone. The amount of fish per serving is generally greater than with *Nigirizushi*, approximating what an American might call a "tuna steak."



In this report, the term "tuna sushi" is used to refer generally to tuna in *nigiri*, *maki*, and *sashimi*.

Species of Tuna

Several species of tuna are served in sushi restaurants. Bluefin tuna is the most sought after. Bigeye and yellowfin tuna are also desirable as toro and maguro sushi. Albacore tuna, or *shiromaguro* is also popular in the United States, so some sushi menus also include it. *`Ahi*, the Hawaiian term for tuna has also become associated with sushi and sashimi. *`Ahi* typically refers to yellowfin tuna, bigeye tuna, or albacore tuna. Although many patrons do not ask, a sushi order could include any of these various species of tuna. Species of tuna vary in average mercury concentration, as indicated in the chart of common species below.

Average mercury concentrations of common tuna species

Tuna Species	FDA Mercury Data ¹¹	Scientific Name	Japanese Names	Hawaiian Names
Albacore	0.357 ppm	<i>Thunnus alalunga</i>	shiromaguro, tombo, bincho, binnaga	`ahipalaha, tombo `ahi
Bigeye	0.639 ppm	<i>Thunnus obesus</i>	bachi, mebachi	`ahi, `ahi po`o nui
Bluefin	NA	<i>Thunnus thynnus</i>	maguro, kuromaguro	
Bonito	NA	<i>Sarda sarda</i>	katsuo	
Skipjack	0.205 ppm	<i>Katsuwonus pelamis</i>	katsuo	Aku
Yellowfin	0.325 ppm	<i>Thunnus albacares</i>	kihada	`ahi

Unfortunately, the FDA has performed only limited testing of the tuna species commonly served as sushi. There is no public data available for bluefin tuna despite the popularity of this species in the US. However, the Japanese government released test data that showed bluefin tuna averaging 1.305 ppm – well above the FDA action level.¹²

Findings: Mercury Concentrations in Chicago Restaurant Tuna Sushi³

An analysis of the 20 Chicago restaurant tuna sushi samples finds:

- The mean mercury concentration in Chicago restaurant tuna sushi samples was 0.446 ppm. The median mercury concentration was 0.350 ppm. The mean mercury concentration was 116% higher than what the FDA reports for tuna (0.383 ppm)¹³ and was close to the 0.50 ppm legal limit for fish sold in Canada and the European Union.
- Of the 20 samples tested, 14, or 70 percent, exceeded Illinois Environmental Protection Agency's (IEPA) special advisory threshold for methylmercury. The special advisory threshold, designed to give guidance to Illinois anglers who eat their catch, is the mercury contamination level at which the agency recommends women of childbearing age and children eat no more than one meal of fish per month.
- Of these, three (one in seven) were unsafe for women and children to eat because their mercury concentration exceeded 0.730 ppm, the average of king mackerel, which the U.S. Food and Drug Administration (FDA) tells pregnant or nursing mothers, women of childbearing age, and children to never eat.
- Of these, two (10 percent) of the tuna samples were unsafe for *all* consumers because they exceeded the FDA action level of 1.0 ppm. The action level is the legal limit for fish sold in the United States; when fish exceed the action level, the FDA is empowered to remove them from the retail market.
- The mean mercury concentration of Chicago yellowfin samples was 0.556 ppm, with a median of 0.343 ppm. The mean 171% higher than the average mercury concentration of 0.325 ppm that FDA reports for yellowfin tuna. Two yellowfin samples exceeded the FDA action level of 1.0 ppm.
- The mean mercury concentration of Chicago bluefin samples was 0.385 ppm, with a median of 0.378 ppm. The FDA has not published mercury concentration data for bluefin tuna.
- Of the two albacore tuna samples included in the study, one of the samples had a mercury concentration of 0.623 ppm – about 175% the FDA-reported average of 0.357 ppm.
- There was a high degree of variability among sushi samples, ranging from 0.104 ppm to 1.522 ppm. Even within a given restaurant or reported tuna species, variability was high, making predictions of mercury concentration by consumers virtually impossible.



³ As previously indicated, tuna sample species were recorded as indicated by restaurant staff. Statistics regarding species are uncertain since it is not possible to confirm tuna species with the analytic methods employed in this study.

*Findings: Mercury Concentrations in Chicago Restaurant Tuna Sushi
(Samples collected between March 31 and April 5, 2006)*

Restaurant	City	Reported Species⁴	Type	ppm
Benihana	Chicago	Yellowfin	maki/roll	0.141
Benihana	Chicago	Yellowfin	sashimi/nigiri	0.104
Benihana	Lombard	Bluefin	sashimi/nigiri	0.427
Benihana	Lombard	unknown	maki/roll	0.164
Benihana	Schaumburg	Bluefin	sashimi/nigiri	0.812
Benihana	Schaumburg	Bluefin	maki/roll	0.378
Benihana	Wheeling	Yellowfin	maki/roll	0.489
Benihana	Wheeling	Yellowfin	sashimi/nigiri	0.276
Heat	Chicago	Albacore	sashimi/nigiri	0.623
Japonais	Chicago	Bluefin	maki/roll	0.415
Japonais	Chicago	Bluefin	sashimi/nigiri	0.237
Japonais	Chicago	Albacore	sashimi/nigiri	0.211
Matsuya	Chicago	Yellowfin	sashimi/nigiri	0.410
Matsuya	Chicago	Yellowfin	maki/roll	0.134
Mirai	Chicago	Bluefin	maki/roll	0.322
Mirai	Chicago	Bluefin	sashimi/nigiri	0.305
Ra Sushi	Chicago	Bluefin	sashimi/nigiri	0.452
Ra Sushi	Chicago	Bluefin	maki/roll	0.119
Sushi Wabi	Chicago	Yellowfin	maki/roll	1.522
Sushi Wabi	Chicago	Yellowfin	sashimi/nigiri	1.376

Conclusions:

- This study found a high degree of variability in mercury concentration among tested samples, with both the average and mean concentrations high enough to be dangerous.
- Because consumers have no way of knowing how much mercury they are exposing themselves to whenever they order tuna sushi, members of sensitive populations should avoid tuna sushi. Given that ten percent of samples tested ranged above the legal U.S. mercury concentration limit, all consumers, and especially those who eat sushi frequently, might take commonsense precautions to find safer alternatives when dining out.
- There is no reason for those outside of Chicago to believe that their tuna sushi is any safer. Similar studies conducted by GotMercury.Org in San Diego and Los Angeles found mean and median mercury concentrations as high or higher than found in Chicago.

⁴ As previously indicated, tuna sample species were recorded as indicated by restaurant staff. It is not possible to confirm tuna species with the analytic methods employed in this study.

Policy Recommendations

Based on this study's finding of dangerous mercury concentrations in Chicago tuna sushi, Environment Illinois and GotMercury.Org recommend the following changes in federal, state, and local policy reduce the health threat of mercury contamination.

Restaurant Policies

1. *Restaurants and stores where tuna sushi is sold should post clear and concise consumer advisories so that consumers may make informed choices about what to eat.*

Restaurants should take affirmative steps to inform consumers with mercury-in-seafood advisories similar to those required under California Proposition 65 (see Appendix B).

Under a resolution, passed by the Illinois legislature last year, the Illinois Department of Health is designing a mercury advisory sign that restaurants may post voluntarily. Posting such advisories should be required of all restaurants in Illinois, and until it is, restaurants should do so voluntarily.

Although mercury advisory signs are a simple method for informing consumers, businesses that sell sushi may decide to stop selling tuna because mercury levels are too high and unpredictable. These restaurants and supermarkets may elect to not serve those fish known to be highest in mercury, which, in addition to tuna, are king mackerel, swordfish, shark, and tilefish.

Although not yet widely available, there exist affordable new technologies to rapidly measure the mercury content of fish. Restaurants should begin to require their suppliers to test seafood before purchase, and they should not take possession of any fish that has mercury levels exceeding the FDA's 1.0 ppm action level. Restaurants may want to set their own mercury concentration limit below the FDA action level and inform their patrons that they serve seafood particularly low in mercury.

FDA Mercury Advisory Policies

2. *The FDA should update its fish consumption advisory for sensitive populations to recommend that they do not eat tuna. The FDA should require restaurants and supermarkets to post its mercury advisory.*

The FDA currently warns women of childbearing age and children that they should not eat king mackerel, (average mercury concentration: 0.730 ppm), swordfish (0.97 ppm), shark (0.988 ppm), and tilefish (1.45 ppm).¹⁴ In 2006, the FDA published new data indicating bigeye tuna, popular as sushi and sashimi and also sold as *ahi*, had an average mercury concentration 0.639 ppm – nearly as high as king mackerel, which FDA warns women and children never to eat.¹⁵ In this study, about one in seven tuna samples tested contained mercury concentrations higher than king mackerel. Given these findings, FDA should recommend that sensitive populations avoid tuna altogether. Currently, FDA explicitly

recommends that women and young children no more than 6 ounces of albacore tuna per week.

3. *FDA should collect more data about mercury concentrations in fish and pull fish from the market when their mercury concentration exceeds the 1.0 ppm action level.*

The differences between average mercury concentrations of tuna in this study and those reported by FDA highlight the need for more extensive mercury testing on a national level. Currently, the FDA only tests about 1% of our national food supply. By comparison, Canada requires 15% of imported seafood to be tested. The European Union has a rapid alert system that pulls fish from the market when seafood exceeds standards. The FDA should pull any fish from the market that exceeds its 1.0 ppm action level for mercury.

State and Local Mercury Advisory Policies

4. *In the absence of federal leadership, state and local governments should take the initiative to require point-of-sale mercury advisories.*

The federal government and most state and local governments do not yet require restaurants and supermarkets to post consumption advisories for tuna or other fish. As awareness of the health risks of mercury grows, restaurants and supermarkets are beginning to voluntarily post mercury advisories, but advisories should be required everywhere high-mercury fish is sold. California does require mercury advisories where fish is sold (see California's required fish consumption advisory sign in Appendix A).

There have been several local attempts to adopt mercury advisory requirements in Illinois. During the 2006 legislative session, Illinois State Representative Harry Osterman (D-14) introduced a resolution urging supermarkets to begin posting mercury advisories consistent with the FDA and EPA mercury advisory for children and women of childbearing age. On May 3, 2006, the Illinois House of Representatives unanimously passed the resolution.¹⁶ The Illinois Department of Public Health is currently designing mercury advisory signs. Last February in Chicago, Aldermen Edward Burke (14th Ward), Virginia Rugai (19th Ward) and Leslie Hairston (5th Ward) introduced a pending ordinance that would require retailers to post signs regarding canned tuna and mercury.¹⁷ To date, however, neither the state of Illinois nor the city of Chicago requires restaurants or supermarkets to post mercury advisories for seafood. They should.

Policies to Reduce Mercury Pollution at the Source

5. *Federal, state, and local governments should enact policies to reduce mercury pollution at the source, which could ultimately lead to a reduced risk of mercury exposure from fish and a healthier public.*

Illinois has been the site of several recent revelations about dangerous levels of mercury in fish. In December, the Chicago Tribune broke a nationally reported news story revealing U.S. EPA and FDA's failure to systematically monitor and warn consumers about mercury in canned tuna and other fish available in stores. In April, Environment Illinois issued a report showing that the average sport fish tested in 36 Illinois counties, 66 individual lakes and

streams, and 16 fish species exceeds the U.S. EPA safe limit for a woman of average weight who eats fish twice per week.

Illinois policy makers have responded with proposals to notify consumers and prevent mercury pollution at the local, state, and national levels. An Illinois EPA rule to reduce mercury emissions from coal-fired power plants by 90 percent will likely come before a legislative committee for final approval in October. In July, Illinois Senator Barack Obama introduced two bills in Congress to prohibit the export of mercury and phase out its use in certain industrial processes. Aside from a bill sponsored last session by State Representative Karen May (D-58) to recycle mercury-containing automobile switches, none of these measures has yet been adopted.

Appendix A: The FDA Fish-Mercury Advisory

In March 2004, the Food and Drug Administration and the Environmental Protection Agency issued a joint advisory regarding mercury in seafood.¹⁸ The advisory is directed at women of childbearing age and children. The FDA and EPA advise:

1. Do not eat swordfish, king mackerel, shark, or tilefish because they contain high levels of mercury.
2. Eat up to 12 ounces (2 average meals) a week of a variety of fish and shellfish that are lower in mercury.
 - Five of the most commonly eaten fish that are low in mercury are shrimp, canned light tuna, salmon, pollock, and catfish.
 - Another commonly eaten fish, albacore ("white") tuna has more mercury than canned light tuna. So, when choosing your two meals of fish and shellfish, you may eat up to 6 ounces (one average meal) of albacore tuna per week.
3. Check local advisories about the safety of fish caught by family and friends in your local lakes, rivers, and coastal areas. If no advice is available, eat up to 6 ounces (one average meal) per week of fish you catch from local waters, but do not consume any other fish during that week.

Appendix B: The California Fish-Mercury Advisory

In California, Proposition 65 requires any business that sells fish and has more than 10 employees to post the mercury-in-seafood advisory shown below. After lawsuits by California Attorney General Bill Lockyer, the restaurants named in the suit settled in February 2005 and began posting advisories to warn customers of the health risks of mercury. Benihana Inc. was one of several large restaurant chains in California to agree to post mercury advisories.

WARNING!

Nearly all fish and seafood contain some amount of mercury and related compounds, chemicals known to the State of California to cause cancer, and birth defects or other reproductive harm. Certain fish contain higher levels than others.

Pregnant and nursing women, women who may become pregnant, and young children **should not eat** the following fish:

SWORDFISH · SHARK · KING MACKEREL · TILEFISH

They should also limit their consumption of other fish, including **fresh or frozen tuna**.

Fish and seafood can be an important source of nutrients and an important part of a balanced diet. However, the federal Food and Drug Administration advises pregnant and nursing women and women who may become pregnant to limit their consumption of fish to no more than 12 ounces per week.

Fish that tend to have little or no mercury include salmon (fresh, frozen, or canned), shrimp, and scallops. Mercury levels in canned tuna vary, but on average are lower than levels in many other fish. Chunk or chunk light tuna has less mercury than solid white or chunk white tuna.

The California Department of Health Services ("DHS") recommends certain steps you can take to reduce mercury exposure:

- Eat a variety of different types of fish;
- Eat smaller fish rather than older, larger fish;
- Begin following these guidelines one year before becoming pregnant.

For more information consult the following websites:

U.S. Food and Drug Administration ("FDA") www.cfsan.fda.gov
U.S. Environmental Protection Agency www.epa.gov/mercury
California Department of Health Services
www.dhs.ca.gov/ps/deodc/ehib/ehib2/topics/mercury_in_fish.html

or call the FDA toll-free at **1-888-SAFEFOOD (1-888-728-3366)**.

Appendix C: Benihana's Fish-Mercury Advisory

This is the mercury advisory Benihana has stated it posts in its restaurants outside of California, including in Illinois. Benihana began posting these advisories after GotMercury.Org members urged the restaurant chain to post advisories nationwide, as they are required to do under California's Proposition 65. GotMercury.Org is continuing to urge Benihana to post advisories modeled after California's mercury warning sign (see Appendix B).

CONSUMER ADVISORY

Consuming raw or undercooked meats, poultry, seafood, shellfish such as sushi and sashimi or eggs may increase your risk of foodborne illness especially if you have certain medical condition.

Chemicals known to cause cancer, or birth defects or other reproductive harm may be present in foods or beverages sold or served here. Among such food are fish and seafood served both at Teppan tables and Sushi Bar. **Fish and seafood** can be an important source of nutrients and an important part of a balanced diet. Nearly all fish and seafood contain some amount of mercury and related compounds, chemicals known to cause cancer, and birth defects or other reproductive harm. The U.S. Food and Drug Administration ("FDA") has identified certain fish, including shark, swordfish, yellowfin tuna, ahi, tilefish and mackerel contain higher level than others. Such fish and seafood as salmon, halibut, cod, sole, shrimp and scallops are listed as having little or no mercury.

The FDA advises pregnant or breastfeeding women, or women who might become pregnant, not to eat more than an average of 12 ounces of fish and seafood per week.

For more information consult the following websites:

U.S. FDA: <http://www.cfsan.fda.gov/seafood1.html>

U.S. Environmental Protection Agency: www.epa.gov

Or call the FDA toll-free at 1-888-SAFEFOOD (1-888-728-3366).

- ¹ US Food and Drug Administration and US Environmental Protection Agency (March 2004). "Revised Consumer Advisory on Methylmercury in Fish." Available at <http://www.fda.gov/bbs/topics/news/2004/NEW01038.html>
- ² Lamborg, C. H., et al. (2002). "A non-steady-state compartmental model of global-scale mercury biogeochemistry with interhemispheric atmospheric gradients." *Geochimica et Cosmochimica Acta*, 66.7 1105-1118.
- ³ Committee on the Toxicological Effects of Methylmercury, Board on Environmental Studies and Toxicology, National Research Council (2000). Toxicological Effects of Methylmercury.
- ⁴ Mahaffey, K. R., et al. (April 2004). "Blood Organic Mercury and Dietary Mercury Intake: National Health and Nutrition Examination Survey, 1999 and 2000," Environmental Health Perspectives, 112.5 569, available at <http://ehp.niehs.nih.gov/members/2003/6587/6587.pdf>
- ⁵ US Food and Drug Administration and US Environmental Protection Agency (March 2004). "What You Need to Know About Mercury in Fish and Shellfish." Available at <http://www.cfsan.fda.gov/~dms/admehg3.html>
- ⁶ Committee on the Toxicological Effects of Methylmercury, Board on Environmental Studies and Toxicology, National Research Council (2000). Toxicological Effects of Methylmercury.
- ⁷ Oken, E. et al. (2005). "Maternal Fish Consumption, Hair Mercury, and Infant Cognition in a U.S. Cohort. Environmental Health Perspectives." 113:10. Available at <http://ehp.niehs.nih.gov/members/2005/8041/8041.pdf>
- ⁸ Virtanen, J. K. et al., (2005). "Mercury, Fish Oils, and Risk of Acute Coronary Events and Cardiovascular Disease, Coronary Heart Disease, and All-Cause Mortality in Men in Eastern Finland." Arterioscler Thromb Vasc Biol., 25:228-233. Available at <http://atvb.ahajournals.org/cgi/content/abstract/25/1/228>
- ⁹ Zagat Survey (2006). "Zagat Release 2006 America's Top Restaurants Survey." Available at <http://www.zagat.com/about/about.aspx?menu=PR43>
- ¹⁰ Keating, M.H. et al (1997). Mercury Study Report to Congress, vol. 1, 2-5. Available at <http://www.epa.gov/ttncaaa1/t3/reports/volume1.pdf#search=%22Mercury%20Study%20Report%20to%20Congress%2C%20volume%201%22>
- ¹¹ US Food and Drug Administration, (February 2006). "Mercury Levels in Commercial Fish and Shellfish." Available at <http://www.cfsan.fda.gov/~frf/sea-mehg.html>
- ¹² Japanese Ministry of Health, Labour and Welfare (June 3, 2003). "Advice for Pregnant Women on Fish Consumption Concerning Mercury Contamination" Available at <http://www.mhlw.go.jp/english/wp/other/councils/mercury/index.html>
- ¹³ US Food and Drug Administration, (February 2006). "Mercury Levels in Commercial Fish and Shellfish." Available at <http://www.cfsan.fda.gov/~frf/sea-mehg.html>
- ¹⁴ US Food and Drug Administration and US Environmental Protection Agency (March 2004). "Revised Consumer Advisory on Methylmercury in Fish." Available at <http://www.fda.gov/bbs/topics/news/2004/NEW01038.html>
- ¹⁵ US Food and Drug Administration, (February 2006). "Mercury Levels in Commercial Fish and Shellfish." Available at <http://www.cfsan.fda.gov/~frf/sea-mehg.html>
- ¹⁶ Illinois General Assembly, Bill Status of HR1134 (94th General Assembly). Available at <http://www.ilga.gov/legislation/BillStatus.asp?DocNum=1134&GAID=8&DocTypeID=HR&LegID=25623&SessionID=50&SpecSess=&Session=&GA=94>
- ¹⁷ Roe, S. & Washburn, G. (February 9, 2006). "Mercury Warnings Pushed for Tuna Cans." Chicago Tribune Available at <http://www.chicagotribune.com/technology/chi-0602090074feb09,1,288338.story?coll=chi-news-hed&ctrack=1&cset=true>
- ¹⁸ US Food and Drug Administration and US Environmental Protection Agency (March 2004). "What You Need to Know About Mercury in Fish and Shellfish." Available at <http://www.cfsan.fda.gov/~dms/admehg3.html>