



# Seafood & Your Health From Mercury to Omega-3's

## Infographic

<http://www.oneworldocean.com/blog/entry/know-your-seafood-infographic>

## Citations and Further Resources

### INTRO

Eating seafood has health benefits and risks. You can get a delicious, ocean-friendly, and sustainable meal, if you know what to avoid and what to look for.

Sustainably sourced seafood is generally healthier than conventional seafood.

- Gerber, Leah R., Roxanne Karimi, and Timothy P. Fitzgerald. "Sustaining Seafood for Public Health." *Frontiers in Ecology and the Environment* 120003rd ser. 10.1890 (2012): n. pag. Print.

### Toxins in the food web

5,500 metric tons of mercury are released into the atmosphere by humans every year.

- Trasande, L., Landrigan, P.J., Schechter, C. Public health and economic consequences of methyl mercury toxicity to the developing brain. *Environmental Health Perspectives* vol.113 p.590-596. 2005.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1257552/>

Mercury, lead, arsenic, cadmium, and dioxins end up in the atmosphere, streams, and oceans as byproducts of burning of fossil fuels and industrial processes.

### Bioaccumulation:

Toxins are breathed, swallowed or absorbed into marine organisms' bodies, becoming more concentrated than in the surrounding environment.

- Bioaccumulation and Biomagnification. Marietta College. 2002.

<http://www.marietta.edu/~biol/102/2bioma95.html>

Any mercury in your system is probably from seafood.

- Trasande, L., P.J. Landrigan, and C. Schechter. Public health and economic consequences of methyl mercury toxicity to the developing brain. *Environmental Health Perspectives* vol.113 p.590-596. 2005.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1257552/>

### Biomagnification:

Bioaccumulated toxins move their way up the food web.

Higher on the food web = more toxins.

Primary producers (algae, plankton) absorb toxins from the water. Primary consumers absorb toxins from their environment, too, but they also ingest it from eating the plankton. Intermediate predators absorb it and also get it from their own prey, the primary consumers, and the plankton the primary consumers ate. Top predators (tuna, sharks, swordfish, dolphins, whales) absorb toxins from the water in addition to absorbing the toxins from everything below them on the foodweb.

- Gray, J.S. Biomagnification in marine systems: the perspective of an ecologist. *Marine Pollution Bulletin* 45 (2002) 46-52. [http://www.com.univ-mrs.fr/~boudouresque/Publications\\_FLUC\\_2007\\_2008/Gray\\_2002\\_Mar\\_Poll\\_Bull.pdf](http://www.com.univ-mrs.fr/~boudouresque/Publications_FLUC_2007_2008/Gray_2002_Mar_Poll_Bull.pdf)

Sharks are high in BMAA (beta-methylamino-L-alanine), which is linked to neurodegenerative diseases like Alzheimer's, Lou Gehrig's, and Parkinson's diseases.

- Mondo, K., N. Hammerschlag, M. Basile, J. Pablo, S.A. Banack, and D.C. Mash. Cyanobacterial Neurotoxin  $\beta$ -N-methylamino-L-alanine (BMAA) in Shark Fins. *Marine Drugs* 10(2), 509-520. 2012. doi:[10.3390/md10020509](https://doi.org/10.3390/md10020509) Link: <http://www.mdpi.com/1660-3397/10/2/509>

Orcas in the Pacific Northwest were found with 200x the PCB levels of toxic waste. Canadian guidelines classify material with concentrations of 50ppm or more as hazardous waste. The blubber of orcas from Dungeness Spit, WA had concentrations of over 1,000 ppm.

- Oceana. Toxic Burden: PCBs in Marine Life. 2003. (Page 3). [http://oceana.org/sites/default/files/o/fileadmin/oceana/uploads/reports/toxic\\_burden\\_final.pdf](http://oceana.org/sites/default/files/o/fileadmin/oceana/uploads/reports/toxic_burden_final.pdf)

### Health risks

Average mercury concentrations (parts per million)

Swordfish (top predator): 0.98

Cod (intermediate predator): 0.11

Sardine (primary consumer): 0.01

- FDA. Mercury levels in commercial fish and shellfish. 2010. <http://www.fda.gov/food/foodsafety/product-specificinformation/seafood/foodborne pathogenscontaminants/methylmercury/ucm115644.htm>

**Mercury risks:**

Prenatal: delayed learning, poor motor control, severe disabilities

Adult: headaches, memory loss, heart disease

- Trasande, L., Landrigan, P.J., Schechter, C. Public health and economic consequences of methyl mercury toxicity to the developing brain. *Environmental Health Perspectives* vol.113 p.590-596. 2005.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1257552/>

FDA: Children and women who are or may become pregnant should avoid seafood high in mercury.

- FDA. What you need to know about mercury in fish and shellfish. 2011.

<http://www.fda.gov/food/foodsafety/product-specificinformation/seafood/foodbornepathogenscontaminants/methylmercury/ucm115662.htm>

Highest mercury (ppm):

Tilefish 1.45; Shark 1.00; Swordfish 1.00; King mackerel 0.73; Orange roughy 0.57; Marlin 0.49; Tuna 0.14-0.69

Lowest mercury (ppm):

Herring 0.08; Trout 0.07; Atlantic mackerel 0.05; Catfish 0.03; Anchovies 0.02; Molluscs 0.01; Tilapia 0.01

- FDA. Mercury levels in commercial fish and shellfish. 2010.

<http://www.fda.gov/food/foodsafety/product-specificinformation/seafood/foodbornepathogenscontaminants/methylmercury/ucm115644.htm>

Marine mammal consumption is increasing in west African countries; Japan is the top consumer.

- Main, D.M. When marine mammals become food. *The New York Times*. 2012.

<http://green.blogs.nytimes.com/2012/01/27/when-marine-mammals-become-food/>

**PCB risks:**

Prenatal: lower birth weight, lowered visual recognition, delayed muscle development

- Jacobson, J.L., S.W. Jacobson, and H.E.B. Humphrey. Effects of in utero exposure to polychlorinated biphenyls and related contaminants on cognitive functioning in young children. *The Journal of Pediatrics* 116(1):38-45. 1990.

<http://www.sciencedirect.com/science/article/pii/S0022347605816427>

- Vreugdenhil, H.J.I., C.I.Lanting, P.G.H. Mulder, E.R. Boersma, and N.Weisglas-Kuperus. Effects of prenatal PCB and dioxin background exposure on cognitive and motor abilities in Dutch children at school age. *The Journal of Pediatrics* 140(1): 48-56. 2002.

<http://www.trwnews.net/Documents/Dioxin/Vreugdenhil2002%20effects%20on%20cognitive%20abilities%20in%20children.pdf>

Adult: lower memory and learning capability

- Schantz, S.L., D.M. Gasior, E. Polverejan, R.J. McCaffrey, A.M. Sweeney, H.E. Humphrey, and J.C. Gardiner. Impairments of memory and learning in older adults exposed to polychlorinated biphenyls via consumption of Great Lakes fish. *Environmental Health Perspectives* 109(6):605-611. 2001.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240343/>

**Eat lower on the food web**

Super green fish: high omega-3s, low in mercury (>0.07ppm), & ocean-friendly.

Farmed oysters, wild Pacific sardines, US pole-caught albacore tuna, farmed rainbow trout, wild Alaskan salmon.

- Monterey Bay Aquarium Seafood Watch. The Super Green List.

[http://www.montereybayaquarium.org/cr/cr\\_seafoodwatch/sfw\\_health.aspx](http://www.montereybayaquarium.org/cr/cr_seafoodwatch/sfw_health.aspx)

Wild salmon have fewer contaminants than unsustainably farmed salmon.

- Hites, R.A., J.A. Foran, S.J. Schwager, B.A. Knuth, M.C. Hamilton, and D.O. Carpenter. Global assessment of polybrominated diphenyl ethers in farmed and wild salmon. *Environmental Science and Technology* 38(19):4945-4949. 2004.

<http://pubs.acs.org/doi/abs/10.1021/es049548m>

**Get educated**

More than 1.5 billion people rely on seafood as their primary source of protein.

- FAO (Fisheries and Aquaculture Department). "The State of World Fisheries and Aquaculture 2008." Food and Agriculture Organization of the United Nations. Rome, 2008. <ftp://ftp.fao.org/docrep/fao/011/i0250e/i0250e.pdf>

Muscles, organs, and the immune system are built and maintained by protein, which can come from animal or vegetarian sources.

- Easy Diet for Life. The importance of protein.

<http://www.easydietforlife.com/importance-of-protein.html>

Omega-3 fatty acids are proteins that provide various health benefits and cannot be made by the human body, but are abundant in many fish.

- Harvard School of Public Health: The Nutrition Source. Omega-3 Fatty Acids: an essential contribution.

<http://www.hsph.harvard.edu/nutritionsource/what-should-you-eat/omega-3-fats/>

Check out kidsafeseafood.org, by SeaWeb, which educates families to consume sustainable seafood that advances ocean and human health.

- KidSafeSeafood. <http://www.kidsafeseafood.org/> Get Monterey Bay Aquarium's Seafood Watch app to make sustainable choices at grocery stores and restaurants.

- Monterey Bay Aquarium Seafood Watch: Seafood Recommendations.

[http://www.montereybayaquarium.org/cr/cr\\_seafoodwatch/sfw\\_recommendations.aspx?c=ln](http://www.montereybayaquarium.org/cr/cr_seafoodwatch/sfw_recommendations.aspx?c=ln)



To get in touch with One World One Ocean, contact [team@oneworldoneocean.com](mailto:team@oneworldoneocean.com)