March 2014

National Listing of Fish Advisories NEWSLETTER

Recent Advisory News

Guam EPA - Reminder - Fish/shellfish advisories remain in effect for Cocos Lagoon, Orote Point, and Agana Swamp

The Guam Environmental Protection Agency (EPA) is reminding residents of three longstanding fish and shellfish advisories, issued by the Guam Department of Public Health and Social Services, in effect for Cocos Lagoon, Orote Point, and the Agana Swamp. A fish consumption advisory for Cocos Lagoon has been in effect since 2006 because fish tissue sampling, conducted by the U.S. Coast Guard, indicated levels of polychlorinated biphenyls (PCBs) above U.S. EPA recommended screening values. The Orote Point seafood advisory was issued in 2001 for the west side of Orote Peninsula (Rizal Beach to Spanish Steps) and Gabgab beach in Apra Harbor and extends 600 feet from shore. Seafood including fish, shellfish, algae, or sea grapes caught in these areas may contain PCBs, chlorinated pesticides, or dioxins at levels that are not safe to eat. The Agency for Toxic Substances & Disease Registry (ATSDR) advises choosing younger, smaller fish and other seafood to reduce exposure to contaminants whenever possible. Residents are also encouraged to remove skin, internal organs, and fatty tissue in the belly and along the side of seafood to reduce potential exposure to chemicals. An advisory was issued for fish and shellfish in the Agana swamp and river in 2000, after test results indicated that fish and eels in the river and swamp area had higher levels of PCBs. Link to original article: http://www.pacificnewscenter.com/index.php?option=com_content&view=article&id=41779:guam-epa-&catid=45:guam-news&Itemid=156

Source: Guam News. www.pacificnewscenter.com. 02/01/2014.

River's mercury debated - The McKenzie's distinction of having pristine water could be threatened if it is added to a contaminated list

Oregon environmental officials are considering a proposal to add the McKenzie River to a list of mercury-contaminated waters due to detectable amounts of mercury in fish tissue samples. Different agencies are at odds about whether mercury is actually present in the river water, and they suggest the state's fish sampling process was flawed and the new standard for the level of mercury that can be present in fish is too stringent. In 2008 and 2009, the Department of Environmental Quality (DEQ) sampled tissue from northern pikeminnow and large-scale sucker found swimming near the mouth of the McKenzie in the Springfield area and found mercury levels that, at that time, were considered acceptable. The DEQ later approved tougher mercury standards, which made the level in those fish seven times higher than the new acceptable level for mercury in fish tissue. Critics question the results because the types of fish tested also swim in the Willamette River, where mercury is known to be present. If the McKenzie is added to the state's list of mercury-contaminated waters, the state must determine the source of the mercury and develop a clean-up plan. River water is sampled at the intake of a water treatment plant in Springfield four times a year and tested for mercury and other pollutants, and no mercury has been detected in any samples at present. The Eugene Water & Electric Board (EWEB), which draws its drinking water from the McKenzie River, plans to submit a letter to the DEQ requesting that the state do more testing before it lists the McKenzie as mercury-impaired. Link to original article: http://www.registerguard.com/rg/news/local/31047940-75/mercury-fish-mckenzie-state-river.html.csp.

Source: Woolington, Josephine. The Register-Guard. 02/01/2014.

DSHS issues fish consumption advisory for Neches River

In a recent news release, the Texas Department of State Health Services (DSHS) issued a fish consumption advisory for portions of the Neches River Basin, including the Sam Rayburn Reservoir and the B.A. Steinhagen Reservoir. This advisory is for six species of fish caught between the State Highway 7 bridge west of Lufkin downstream to the U.S. Highway 96 bridge near Evadale and both of the aforementioned reservoirs. Laboratory analysis of fish tissue samples revealed elevated levels of mercury and dioxins in flathead catfish, gar (all species), smallmouth buffalo, blue catfish longer than 30 inches, and largemouth and spotted bass longer than 16 inches. DSHS recommends that women of childbearing age and children under 12 avoid eating any of the affected species because the nervous systems of unborn and young children are particularly susceptible to the health effects of toxins. Women past childbearing age and adult men are cautioned to limit consumption to two eight-ounce meals a month of blue catfish, largemouth bass, and spotted bass, and only one eight-ounce meal per month of gar and flathead catfish. DSHS advises against any consumption of smallmouth buffalo. Link to original press release: http://www.dshs.state.tx.us/news/releases/ 20140127.aspx.

Source: Texas Department of State Health Services. http://www.dshs.state.tx.us. 01/27/2014.

Advocacy group calls for clearer seafood consumption guidelines

In a recent report, the Environmental Working Group (EWG) claims the federal government is not effectively answering seafood consumption questions for consumers, particularly when it comes to advice covering children and pregnant women. The report concludes that people who heed the federal government's advice may consume too much mercury or too few omega-3 fatty acids. The federal dietary guidelines that offer consumption advice were last issued in January 2011 and called for increased consumption of seafood. Now federal agencies are considering 2015 guidelines, and the Environmental Protection Agency is modernizing its seafood guidelines. The EWG has several recommendations for the new guidelines, including: portion-based guidelines for people who face various levels of risk (pregnant women, children, and adults with cardiac disease); highlighted choices of fish that are high in omega-3 fatty acids, low in mercury and sustainably produced; and identification of species with moderate mercury contamination that might pose problems for some people. The EWG report states that the EPA should lower its "safe" mercury level based on evidence that "suggests that mercury does more potent damage to the developing brain than previously thought." Link to original article: http://www.latimes.com/science/sciencenow/la-sci-sn-seafood-guidelines-20140121,0,6297325.story#ixzz2sOJI9ztd.

Source: MacVean, Mary. Los Angeles Times. 01/21/2014.

Toxic waters: Consumption advisories on life-giving year-round fish threaten health

Washington state agencies have issued fish consumption advisories for the Chinook salmon, a staple of the Pacific Northwest diet. Studies of adult salmon indicate that Puget Sound Chinook salmon have higher concentrations of legacy contaminants, such as polychlorinated biphenyls (PCBs), than salmon from other parts of the Northwest. The State recommends limiting consumption to one fillet a week of Puget Sound Chinook, and two fillets a month of Puget Sound resident Chinook (blackmouth). Some Northwest tribes say this contamination threatens their health as well as treaty rights and the way of life of the land's original people. People who eat fish more than once a month would not be protected by Washington State water quality standards. Washington State's Department of Health recommends that residents eat no more than two fish fillets a week and adhere to very strict selection, preparation and cooking criteria to avoid toxicity. In contrast, Washington State's Department of Ecology's fish consumption rate (FCR) recommendation is an eight-ounce fish fillet a month, or 6.5 grams a day. Billy Frank Jr. (Nisqually), chairman of the Northwest Indian Fisheries Commission, expressed that "Washington uses one of the lowest FCRs in the nation to regulate pollution in our waters." Frank believes that "the less fish consumed by residents, the more pollutants that can be dumped into waterways." The higher the fish consumption rate, the cleaner Washington waterways will need to be. This would force polluters to reduce the amount of new contaminants discharged, keeping salmon and other seafood clean for one of the highest fish-consuming populations in the nation. Frank said the effort to adopt a more accurate FCR is one of the biggest public policy battles in the country, pitting human health against the economy. Link to original article:

Conferences

Society of Environmental Toxicology and Chemistry Europe 24th Annual Meeting
May 11-15, 2014, Basel, Switzerland
http://basel.setac.eu/?contentid=636

ICBF2014: 11th International Congress on the Biology of Fish (ICBF)
August 3-7, 2014, Edinburgh, Scotland
http://www.icbf2014.sls.hw.ac.uk/

Annual Meeting of the American Fisheries Society
August 17-21, 2014, Quebec City, QE, Canada
http://afs2014.org/

7th World Recreational Fishing Conference
September 1-4, 2014, Campinas, Brazil
http://www.7wrfc.com/

National Forum on Contaminants in Fish
September 22-24, 2014, Alexandria, Virginia
http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/index.cfm

ICMGP 2015 - 12th International Conference on Mercury as a Global Pollutant (ICMGP)
June 14–19, 2015, Jeju, South Korea
http://www.mercury2015.com/

http://indiancountrytodaymedianetwork.com/2014/01/10/toxic-salmon-consumption-advisories-life-giving-fish-threatens-health-153048.

Source: Hansen, Terri. http://indiancountrytodaymedianetwork.com. 1/10/2014

Kansas issues 2014 fish consumption advisories

The Kansas Department of Health and Environment and the Kansas Department of Wildlife, Parks and Tourism have issued revised fish consumption advisories for 2014. The updated advisories identify types of fish and aquatic animals that should be eaten in limited quantities or, in some cases, avoided as a result of elevated pollution levels and contaminants in several streams, rivers, and lakes in southeast Kansas. This advisory includes all aquatic life, including fish and shellfish, in Horseshoe Lake located in units 22 and 23 of the Mined Lands Wildlife Area in Cherokee County due to perchlorate. Shellfish (e.g., mussels, clams, and crayfish) in the Spring River from the confluence of Center Creek to the Kansas/Oklahoma border are contaminated with lead and cadmium and are to be avoided. Shellfish in Shoal Creek, from the Missouri/Kansas border to Empire Lake in Cherokee County, should also be avoided as a result of lead and cadmium contamination.

State officials are also warning sensitive populations of Kansas residents to limit their consumption of all types of fish caught throughout the state to one meal per week because of mercury contamination. This advisory includes pregnant women, women who may become pregnant, women who are nursing and children age 17 or younger. Residents are also advised to restrict consumption of black bass species (largemouth, smallmouth, and spotted bass) to one meal per week because of mercury levels. Missouri and Oklahoma also warn residents to limit fish consumption from area lakes and rivers. Link to original article: http://www.joplinglobe.com/local/x1186909180/Kansas-issues-2014-fish-consumption-advisories.

Source: The Joplin Globe. 01/04/2014

Recent Publications

Please note: The following abstracts are reprinted verbatim unless otherwise noted. Titles and citations (only) are listed for publications that are copyright protected.

Lead, cadmium and zinc in hair samples: relationship with dietary habits

This study was performed in order to analyze the relationships between hair zinc, lead, and cadmium with the kind of diet consumed (by recall of the diet consumed the previous 14 days), living area (urban or rural), tobacco smoking, and body mass index (BMI) among 419 individuals of the Canary Archipelago. Median values and interquartile range were 43 μg/g (18.50-132.50) for zinc, 4.09 μg/g (2.19-8.38) for lead, and 0.128 μg/g (0.05-0.30) for cadmium. We observed that hair zinc was markedly elevated among those consuming fish more frequently and, to a lesser amount, among those who consumed meat frequently, among those living in urban areas, and among those with BMI over 25 kg/m^2, keeping a significant relationship with BMI. Hair lead was also higher among fish consumers, showed a trend to higher values among inhabitants of urban areas, and was lower among obese individuals. Hair cadmium was higher among those who consumed less vegetables and fruits. By multivariate analysis, introducing the variables meat, fish, and vegetable consumption, urban/rural; sex; age; and BMI values, we observed that fish consumption (beta = 0.15) was the only variable independently associated to higher zinc levels; fish consumption (beta = 0.15) and meat consumption (beta = 0.17) were related to high cadmium levels, whereas meat consumption was significantly associated to higher hair lead levels (beta = 0.15). Therefore, we conclude that hair zinc, cadmium, and lead seem to depend more heavily on dietary habits than on tobacco consumption or living in rural or urban areas.

Source: Gonzalez-Reimers, E., Martín-González, C., Galindo-Martín, L., Aleman-Valls, M.R., Velasco-Vázquez, J., Arnay-de-la-Rosa, M., Pérez-Hernández, O., Luis, R.H. Departamento de Medicina Interna, Hospital Universitario de Canarias, La Laguna, Tenerife, Canary Islands, Spain "Lead, Cadmium and Zinc in Hair Samples: Relationship with Dietary Habits and Urban Environment." Biological Trace Element Research. 2014 Jan 25. [Epub ahead of print].

Investigation of the effects of a high fish diet on inflammatory cytokines, blood pressure, and lipids in healthy older Australians

BACKGROUND: Aging is a condition of chronic inflammation. In healthy Australians ≥64 years, the primary aim was to determine whether four servings/week of mixed fish (FISH) improves serum cytokines (i.e. C-reactive protein (CRP), IL-1, IL-6, TNF-α) compared to a diet low in fish (<1 serving/week, CONTROL); the secondary aims were to assess the effect of the diet on blood pressure and serum lipids (TC, HDL-C, TG, calculated LDL-C). METHODS: An 8-week randomized, parallel study, stratified by CRP (<3 mg/L vs. ≥3 mg/L) on entry to the study. Compliance was measured using 3-day weighed food records in weeks 1 and 7 of the study. A 12-h fasting blood sample was taken at baseline and 8-weeks for erythrocyte fatty acids as confirmation of compliance, and measurement of serum cytokines and lipids. Blood pressure was measured at both time points. RESULTS: Eighty participants completed the study (mean (sd) age: 69.6 (5.8) years). During week 1 of the study, mean ± SEM daily dietary intake of very long chain omega-3 polyunsaturated fatty acids (VLCN n-3 PUFA) in FISH vs. CONTROL was 1,676±129 mg vs. 27±5 mg ($p<0.001$). Mean (SD) gram intake of study fish and meat was 121 (45) g and 123 (78) g, for those allocated to FISH and CONTROL, respectively. Mean ± SEM percentage VLCN n-3 PUFA in erythrocytes at 8-weeks was higher in those allocated to FISH vs. CONTROL (10.2±0.2% vs. 8.2±0.3%, $p<0.001$). There was no between-group difference in CRP (n=80), IL-1β (n=33) or IL-6 (n=21) concentrations, blood pressure, or lipids, at 8-weeks. CONCLUSIONS: Eight weeks consumption of four servings/week fish did not affect serum cytokine concentrations, blood pressure or lipids compared to a diet low in fish. In healthy older adults with low inflammatory burden, our results do not support that short-term consump-

tion of mixed fish has a beneficial effect on selected cardiovascular biomarkers.

Source: Grieger, J.A., Miller, M.D., Cobiac, L. Department of Nutrition and Dietetics, Flinders Clinical and Molecular Medicine, Flinders Medical Centre, Bedford Park, Australia; CSIRO Preventative Health Flagship, Adelaide, Australia. "Investigation of the effects of a high fish diet on inflammatory cytokines, blood pressure, and lipids in healthy older Australians." Food & Nutrition Research. 2014 Jan 15;58.

Effect of combination of dietary fish protein and fish oil on lipid metabolism in rats

This study examined the effects of fish protein in combination with fish oil on rat lipid metabolism. Male Wistar rats were divided into four groups and fed an AIN93G-based diet with casein (20%) + soybean oil (7%), casein (10%) + fish protein (10%) + soybean oil (7%), casein (20%) + soybean oil (5%) + fish oil (2%), and casein (10%) + fish protein (10%) + soybean oil (5%) + fish oil (2%) for 4 weeks. The dietary combination of fish protein and fish oil decreased the contents of serum triacylglycerol, serum cholesterol, liver triacylglycerol and liver cholesterol in addition to altering liver lipid fatty acid composition. These effects are partly due to the increase in fecal cholesterol, bile acid excretion, and increased enzyme activities of fatty acid β-oxidation in the liver. These data suggest that combined intake of fish protein and fish oil lead to both hypocholesterolemic and hypotriglyceridemic in serum and the liver, while sole intake of fish protein or fish oil decrease only cholesterol and triglyceride levels, respectively. These results suggest that combined intake of fish protein and fish oil may play beneficial roles in the prevention of lifestyle-related diseases as compared with sole fish protein intake.

Source: Hosomi, R., Fukunaga, K., Arai, H., Kanda, S., Nishiyama, T., Yoshida, M. 1Department of Life Science and Biotechnology, Kansai University, Suita, Osaka, Japan; Division of Biotechnology and Environmental Chemistry, Kitami Institute of Technology, Kitami, Hokkaido, Japan; Department of Public Health, Kansai Medical University, Moriguchi, Osaka , Japan. "Effect of combination of dietary fish protein and fish oil on lipid metabolism in rats." Journal of Food and Science Technology. 50(2):266-74.

Fish oil suppresses cell growth and metastatic potential by regulating PTEN and NF-κB signaling in colorectal cancer

Homeostasis in eukaryotic tissues is tightly regulated by an intricate balance of the prosurvival and antisurvival signals. The tumor suppressor PTEN (phosphatase and tensin homolog deleted on chromosome 10), a dual-specificity phosphatase, plays a functional role in cell cycle arrest and apoptosis. NF-κB and its downstream regulators (such as VEGF) play a central role in prevention of apoptosis, promotion of inflammation and tumor growth. Therefore, we thought to estimate the expression of PTEN, Poly-ADP-ribose polymerase (PARP), NF-κBp50, NF-κBp65 and VEGF to evaluate the effect of supplementation of fish oil on apoptotic and inflammatory signaling in colon carcinoma. Male wistar rats in Group I received purified diet while Group II and III received modified diet supplemented with FO:CO(1:1)&FO:CO(2.5:1) respectively. These were further subdivided into controls receiving ethylenediamine-tetra acetic-acid and treated groups received dimethylhydrazine-dihydrochloride (DMH)/week for 4 weeks. Animals sacrificed 48 hours after last injection constituted initiation phase and that sacrificed after 16 weeks constituted post-initiation phase. We have analysed expression of PTEN, NF-κBp50, NF-κBp65 by flowcytometer and nuclear localization of NF-κB by immunofluorescence. PARP and VEGF were assessed by immunohistochemistry. In the initiation phase, animals receiving DMH have shown increased % of apoptotic cells, PTEN, PARP, NF-κBp50, NF-κBp65 and VEGF however in post-initiation phase no significant alteration in apoptosis with decreased PTEN and increased PARP, NF-κBp50, NF-κBp65 and VEGF were observed as compared to control animals. On treatment with both ratios of fish oil in both the phases, augmentation in % of apoptotic cells, decreased PTEN, PARP, NF-κBp50, NF-κBp65 and VEGF were documented with respect to DMH treated animals with effect being more exerted with higher ration in post-initiation phase. Hence, fish oil activates apoptosis, diminishes DNA damage and inhibits inflammatory signalling in a dose and time dependent manner so as to inhibit progression of colon cancer.

Source: Kansal S, Bhatnagar A, Agnihotri N. Department of Biochemistry, Panjab University, Chandigarh, India. "Fish oil suppresses cell growth and metastatic potential by regulating PTEN and NF-κB signaling in colorectal cancer." PLoS One. 2014 Jan 8;9(1):e84627.

Habitual fish intake and clinically silent carotid atherosclerosis

BACKGROUND: Fish consumption is recommended as part of a healthy diet. However, there is a paucity of data concerning the relation between fish consumption and carotid atherosclerosis. We investigated the association between habitual fish consumption and asymptomatic carotid

atherosclerosis, defined as the presence of plaques and/or increased intima-media thickness (≥ 0.90 mm), in non-diabetic participants. METHODS: Nine hundred-sixty-one (range of age: 18-89 yrs; 37.1% males) adult participants without clinically known atherosclerotic disease were randomly recruited among the customers of a shopping mall in Palermo, Italy, and cross-sectionally investigated. Each participant answered a food frequency questionnaire and underwent high-resolution ultrasonographic evaluation of both carotid arteries. Routine laboratory blood measurements were obtained in a subsample of 507 participants. RESULTS: Based on habitual fish consumption, participants were divided into three groups: non-consumers or consumers of less than 1 serving a week (24.0%), consumers of 1 serving a week (38.8%), and consumers of ≥ 2 servings a week (37.2%). Age-adjusted prevalence of carotid atherosclerosis (presence of plaques or intima media thickness ≥ 0.9 mm) was higher in the low fish consumption group (13.3%, 12.1% and 6.6%, respectively; P = 0.003). Multivariate analysis evidenced that carotid atherosclerosis was significantly associated with age (OR = 1.12; 95% CI = 1.09-1.14), hypertension on pharmacologic treatment (OR = 1.81; 95% CI = 1.16-2.82), and pulse pressure (OR = 1.03; 95% CI = 1.01-1.04), while consuming ≥2 servings of fish weekly was protective compared with the condition of consumption of <1 serving of fish weekly (OR = 0.46; 95% CI = 0.26-0.80). CONCLUSIONS: High habitual fish consumption seems to be associated with less carotid atherosclerosis, though adequate interventional trials are necessary to confirm the role of fish consumption in prevention of cardiovascular disease.

Source: Buscemi, S., Nicolucci, A., Lucisano, G., Galvano, F., Grosso, G., Belmonte, S., Sprini, D., Migliaccio, S., Cianferotti, L., Brandi, M.L., Rini, G.B. Dipartimento Biomedico di Medicina Interna e Specialistica (DIBIMIS) - Laboratorio di Nutrizione Clinica, University of Palermo, Palermo, Italy. "Habitual fish intake and clinically silent carotid atherosclerosis." Nutrition Journal. 2014 Jan 9;13(1):2.

Mammary inflammation around parturition appeared to be attenuated by consumption of fish oil rich in n-3 polyunsaturated fatty acids

BACKGROUND: Mastitis endangers the health of domestic animals and humans, and may cause problems concerning food safety. It is documented that n-3 polyunsaturated fatty acids (PUFA) play significant roles in attenuating saturated fatty acids (SFA)-induced inflammation. This study was therefore conducted to determine whether mammary inflammation could be affected by consumption of diets rich in n-3 PUFA. METHODS: Forty-eight rats after mating began to receive diets supplemented with 5% fish oil (FO) or 7% soybean oil (SO). Blood and mammary tissue samples (n = 6) at day 0 and 14 of gestation and day 3 postpartum were collected 9 hours after intramammary infusion of saline or lipopolysaccharide (LPS) to determine free fatty acids (FFA) concentration and FA composition in plasma and inflammation mediators in mammary tissues. RESULTS: At day 14 of gestation and day 3 postpartum, the FO-fed rats had lower plasma concentrations of C18:2n6, C20:4n6, total n-6 PUFA and SFA, and higher plasma concentrations of C20:5n3 and total n-3 PUFA than the SO-fed rats. Plasma C22:6n3 concentration was also higher in the FO-fed than in the SO-fed rats at day 3 postpartum. Compared with the SO-fed rats, the FO-fed rats had lower mammary mRNA abundance of xanthine oxidoreductase (XOR) and protein level of tumor necrosis factor (TNF)-α, but had higher mammary mRNA abundances of interleukin (IL)-10 and peroxisome proliferator-activated receptor (PPAR)-γ at day 14 of gestation. Following LPS infusion at day 3 postpartum, the SO-fed rats had increased plasma concentrations of FFA, C18:1n9, C18:3n3, C18:2n6 and total n-6 PUFA, higher mammary mRNA abundances of IL-1β, TNF-α and XOR but lower mammary mRNA abundance of IL-10 than the FO-fed rats. CONCLUSIONS: Mammary inflammation around parturition appeared to be attenuated by consumption of a diet rich in n-3 PUFA, which was associated with up-regulated expression of IL-10 and PPAR-γ.

Source: Lin, S., Hou, J., Xiang, F., Zhang, X., Che, L., Lin, Y., Xu, S., Tian, G., Zeng, Q., Yu, B., Zhang, K., Chen, D., Wu, D., Fang, Z. Key Laboratory for Animal Disease Resistance Nutrition of the Ministry of Education of China, Animal Nutrition Institute, Sichuan Agricultural University, Sichuan, Ya'an, China. "Mammary inflammation around parturition appeared to be attenuated by consumption of fish oil rich in n-3 polyunsaturated fatty acids." Lipids in Health and Disease. 2013 Dec 31; 12(1):190.

Effect of fish oil intake on glucose levels in rat prefrontal cortex, as measured by microdialysis

BACKGROUND: Brain glucose sensing may contribute to energy homeostasis control. The prefrontal cortex (PFC) participates in the hedonic component of feeding

control. As high-fat diets may disrupt energy homeostasis, we evaluated in male Wistar rats whether intake of high-fat fish-oil diet modified cortical glucose extracellular levels and the feeding induced by intracerebroventricular glucose or PFC glucoprivation. METHODS: Glucose levels in PFC microdialysates were measured before and after a 30-min meal. Food intake was measured in animals receiving intracerebroventricular glucose followed, 30-min. later, by 2 -deoxy-D-glucose injected into the PFC. RESULTS: The fish-oil group showed normal body weight and serum insulin while fat pads weight and glucose levels were increased. Baseline PFC glucose and 30-min. carbohydrates intake were similar between the groups. Feeding-induced PFC glucose levels increased earlier and more pronouncedly in fish-oil than in control rats. Intracerebroventricular glucose inhibited feeding consistently in the control but not in the fish-oil group. Local PFC glucoprivation with 2-DG attenuated glucose-induced hypophagia. CONCLUSIONS: The present experiments have shown that, following food intake, more glucose reached the prefrontal cortex of the rats fed the high-fat fish-oil diet than of the rats fed the control diet. However, when administered directly into the lateral cerebral ventricle, glucose was able to consistently inhibit feeding only in the control rats. The findings indicate that, an impairment of glucose transport into the brain does not contribute to the disturbances induced by the high-fat fish-oil feeding.

Source: de Sousa, I.F., de Souza, A.P., Andrade, I.S., Boldarine, V.T., Nascimento, C.M., Oyama, L.M., Telles, M.M., Ribeiro, E.B. Departamento de Fisiologia, Universidade Federal de São Paulo, São Paulo, Brazil. "Effect of fish oil intake on glucose levels in rat prefrontal cortex, as measured by microdialysis." Lipids in Health and Disease. 2013 Dec 26;12(1):188.

Foods, nutrients or whole diets: effects of targeting fish and LCn3PUFA consumption in a 12mo weight loss trial

BACKGROUND: There is some evidence in the literature that emphasizing fish consumption may assist with weight loss. The aim was to assess the effects of advice to consume 2 fish meals per week in a weight loss diet. METHODS: A parallel randomised placebo-controlled trial was conducted in 118 obese Australian adults (mean BMI ± SD 31.3 ± 3.5 kg/m2; mean age ± SD 45 ± 10 y; 28% male). Participants received low calorie dietary advice + placebo (1 g olive oil; Control), low calorie dietary advice emphasizing fish + placebo (Fish), or low calorie dietary advice emphasizing fish diet + LCn3PUFA supplements (Fish + S). Individualised advice targeted 2 MJ energy deficit (30%E fat, 45%E carbohydrate and 25%E protein) with or without two servings (180 g) fatty fish/wk. RESULTS: All groups lost weight at 12 months (Control -4.5 kg vs. Fish -4.3 kg vs. Fish + S -3.3 kg; $p < 0.001$) and percentage body fat (Control: -1.5% vs. Fish: -1.4% vs. Fish + S: -0.7%; $p < 0.001$) but there were no significant differences between groups. Cardiovascular disease risk factors changed as expected from weight loss. CONCLUSIONS: Advice to consume 2 fish meals per week did not enhance the effects on weight loss of a healthy low calorie diet. TRIAL REGISTRATION: ACTRN12608000425392.

Source: Tapsell LC, Batterham MJ, Charlton KE, Neale EP, Probst YC, O'Shea JE, Thorne RL, Zhang Q, Louie JC. Smart Foods Centre, University of Wollongong, Wollongong, Australia. "Foods, nutrients or whole diets: effects of targeting fish and LCn3PUFA consumption in a 12mo weight loss trial." BMC Public Health. 2013 Dec 26;13(1):1231.

Dietary exposure to dioxins and dioxin-like PCBs of Hong Kong adults: results of the first Hong Kong Total Diet Study

Dioxins and dioxin-like polychlorinated biphenyls (PCBs) are persistent organic pollutants (POPs) covered by the Stockholm Convention on POPs. To assess the associated health risk of the Hong Kong population, the dietary exposure of the Hong Kong population and various age-gender subgroups to dioxins and dioxin-like PCBs was estimated in the first Hong Kong Total Diet Study (TDS), where food samples were collected and prepared "as consumed." A total of 142 composite food samples, mainly foods of animal origin and their products and oily food, were analysed for polychlorinated dibenzo-p-dioxins (PCDDs) and

dibenzofurans (PCDFs) and dioxin-like PCBs by the high-resolution gas chromatograph/high-resolution mass spectrometer (HRGC/HRMS) system. Dietary exposures were estimated by combining the analytical results with the food consumption data of Hong Kong adults. The mean and 95th percentile exposures to dioxins and dioxin-like PCBs of the Hong Kong population were 21.9 and 59.7 pg toxic equivalent (TEQ) kg(-1) body weight (bw) month(-1) respectively, which amounted to 31.3% and 85.2% of the provisional tolerable monthly intake (PTMI). The main dietary source of dioxins and dioxin-like PCBs was "Fish and seafood and their products" (61.9% of the total exposure), followed by "Meat, poultry and game and their products" (20.0%) and "Mixed dishes" (6.95%). The study findings suggest that the Hong Kong population is unlikely to experience the major undesirable health effects of dioxins and dioxin-like PCBs.

Source: Wong, W.W., Yip, Y.C., Choi, K.K., Ho, Y.Y., Xiao, Y. Food and Environmental Hygiene Department, Risk Assessment Section , Centre for Food Safety , Hong Kong , China. "Dietary exposure to dioxins and dioxin-like PCBs of Hong Kong adults: results of the first Hong Kong Total Diet Study." Food Additives & Contaminants. Part A, Chemistry Analysis, Control, Exposure and Risk Assessment. 2013 Dec;30(12):2152-8.

Polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs) and perfluorinated alkylated substances (PFASs) in traditional seafood items from western Greenland

In this study, contamination levels were determined for polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs) and perfluorinated alkylated substances (PFASs) in traditional Greenland seafood items, such as raw and smoked fish fillet (salmon and halibut), whale and seal meat and narwhal mattak (skin and blubber). The daily intake of PCBs, PBDEs and PFASs through traditional seafood items in Greenland was assessed. Based on the presented levels of contaminants, in combination with earlier food intake studies, suggests that the daily exposure was below the tolerable daily intake threshold for all compounds. BDE-47 was the only PBDE -congener detected in all food items, except in smoked halibut. The levels of BDE-47 varied from < LOD in smoked halibut up to 18 ng/g lw in narwhal mattak and 21 ng/g lw in whale beef. ∑PCB were lowest in smoked halibut (37 ng/g lw) and highest in narwhal mattak with 1,146 ng/g lw. Perfluorooctane sulfonate (PFOS) was the most common of the PFASs. However, ΣPFASs were below detection limits in most fish fillet samples, and varied from 2.9 ng/g ww in whale beef to 13.5 ng/g ww in seal beef. The present study shows that the exclusion from the diet of local food items such as intestines and blubber have a strong positive effect for the reduction of POPs levels in food, without a reducing the health benefits of traditional food intake considerably.

Source: Carlsson, P., Herzke, D., Kallenborn, R. University Centre in Svalbard, Longyearbyen, Norway. "Polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs) and perfluorinated alkylated substances (PFASs) in traditional seafood items from western Greenland." Environmental Science and Pollution Research International. 2013 Dec 20. [Epub ahead of print]

Circulating and dietary omega-3 and omega-6 polyunsaturated fatty acids and incidence of CVD in the multi-ethnic study of atherosclerosis

BACKGROUND: Dietary guidelines support intake of polyunsaturated fatty acids (PUFAs) in fish and vegetable oils. However, some controversy remains about benefits of PUFAs, and most prior studies have relied on self-reported dietary assessment in relatively homogeneous populations. METHODS AND RESULTS: In a multiethnic cohort of 2837 US adults (whites, Hispanics, African Americans, Chinese Americans), plasma phospholipid PUFAs were measured at baseline (2000-2002) using gas chromatography and dietary PUFAs estimated using a food frequency questionnaire. Incident cardiovascular disease (CVD) events (including coronary heart disease and stroke; n=189) were prospectively identified through 2010 during 19 778 person-years of follow-up. In multivariable-adjusted Cox models, circulating n-3 eicosapentaenoic acid and docosahexaenoic acid were inversely associated with incident CVD, with extreme-quartile hazard ratios (95% CIs) of 0.49 for eicosapentaenoic acid (0.30 to 0.79; Ptrend=0.01) and 0.39 for docosahexaenoic acid (0.22 to 0.67; Ptrend<0.001). n-3 Docosapentaenoic acid (DPA) was inversely associated with CVD in whites and Chinese, but not in other race/ethnicities (P-interaction=0.01). No significant associations with CVD were observed for circulating n-3 alpha-linolenic acid or n-6 PUFA (linoleic acid, arachidonic acid). Associations with CVD of self-reported dietary PUFA were consistent with those of the PUFA biomarkers. All associations were similar across racial-

ethnic groups, except those of docosapentaenoic acid. CONCLUSIONS: Both dietary and circulating eicosapentaenoic acid and docosahexaenoic acid, but not alpha-linolenic acid or n-6 PUFA, were inversely associated with CVD incidence. These findings suggest that increased consumption of n-3 PUFA from seafood may prevent CVD development in a multiethnic population.

Source: de Oliveira Otto, M.C., Wu, J.H., Baylin, A., Vaidya, D., Rich, S.S., Tsai, M.Y., Jacobs, D.R., Mozaffarian, D. Department of Epidemiology, Harvard School of Public Health, Boston, MA. "Circulating and Dietary Omega-3 and Omega-6 Polyunsaturated Fatty Acids and Incidence of CVD in the Multi-Ethnic Study of Atherosclerosis." Journal of the American Heart Association. 2013 Dec 18;2(6):e000506.

Total and inorganic arsenic in foods of the first Hong Kong total diet study

Arsenic (As) is a metalloid that occurs in different inorganic and organic forms, which are found in the environment both from natural occurrence and from anthropogenic activity. The inorganic forms of As are more toxic as compared to the organic As, but so far most of the occurrence data in food collected in the framework of official food control are still reported as total As without differentiating the various arsenic species. In this paper, total As and inorganic arsenic (iAs) contents of 600 total diet study (TDS) samples, sub-divided into 15 different food groups, were quantified by high resolution inductively coupled plasma mass spectrometry (HR-ICP/MS) and hydride generation (HG) ICP/MS respectively. The method detection limits for both total As and iAs were 3 µg As kg-1. As the samples were prepared for TDS, food items were purchased directly from the market or prepared as for normal consumption, i.e. table-ready, in the manner most representative of and consistent with cultural habits in Hong Kong as far as practicable. The highest total As and iAs content were found in "fish, seafood and their products" and "vegetables and their products," respectively. Besides, this paper also presents the ratios of iAs and total As content in different ready-to-eat food items. The highest ratio of iAs to total As was found in "vegetables and their products". It is likely that iAs in vegetables maintained its status even after cooking.

Source: Chung, S.W., Lam, C.H., Chan, B.T. Food Research Laboratory, Centre for Food Safety , Food and Environmental Hygiene Department , 4/F Public Health Laboratory Centre, Hong Kong, China. "Total and inorganic arsenic in foods of the first Hong Kong total diet study." Food Additives & Contaminants. Part A, Chemistry Analysis, Control, Exposure and Risk Assessment. 2013 Dec 19. [Epub ahead of print].

Determination of exposure to lead of subjects from southwestern Poland by human hair analysis

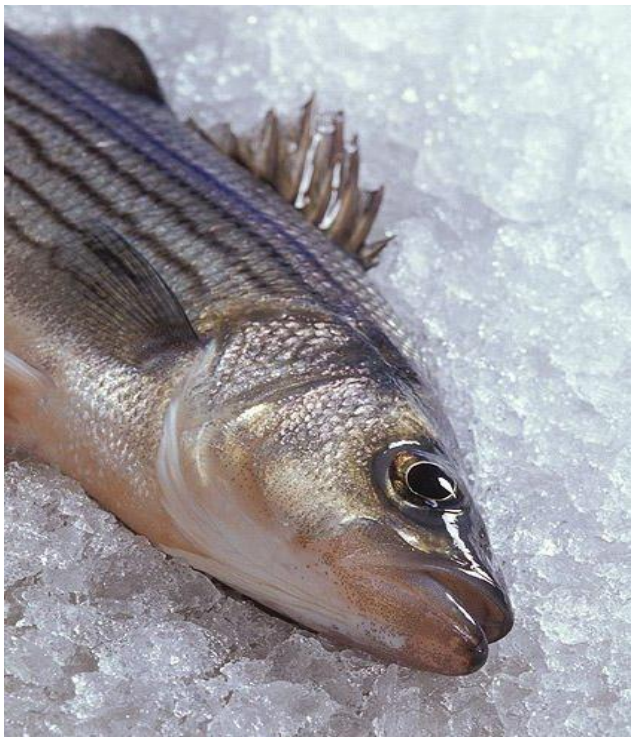
The aim of the present work was to investigate the exposure to lead from various sources by investigation of mineral composition of human scalp hair. The research was carried out on hair sampled from 267 young adults living in Wroclaw (southwest Poland). The effect of the place of residence, diet, and lifestyle on lead content in hair was examined by inductively coupled plasma optical emission spectrometry (ICP-OES). Lead was determined at the wavelength 220.353 nm. These outcomes were reached by linking the results of lead level in hair with the results of questionnaire survey. The mean lead level in hair of the whole examined population was 2.01 ± 2.10 mg kg-1. Lead can enter the human body mainly by inhalation and gastrointestinal absorption. It was found that consuming cheese, fish, and lettuce caused increased level of lead in hair. On the other hand, drinking of milk, tea, coffee, or lemon resulted in decreased content of lead in hair. Additional source of exposure to lead could be cigarette smoking, distance to the traffic road, painting the walls, amalgam filling. Based on the results, it can be concluded that exposure to lead can occur mainly from eating habits and environmental exposure.

Source: Michalak, I., Wołowiec, P., Chojnacka, K. Institute of Inorganic Technology and Mineral Fertilizers, Wroclaw University of Technology, Wroclaw, Poland. "Determination of exposure to lead of subjects from southwestern Poland by human hair analysis." Environmental Monitoring and Assessment. 2013 Dec 18. [Epub ahead of print].

Evaluating the effectiveness of fish consumption advisories: modeling prenatal, postnatal, and childhood exposures to persistent organic pollutants

BACKGROUND: Because human exposure to persistent organic pollutants (POPs) mainly occurs through ingestion of contaminated food, regulatory bodies issue dietary consumption advisories to describe safe intake levels for food items of concern, particularly fish. OBJECTIVES: Our study goal was to estimate the effectiveness of fish consumption advisories in reducing exposure of infants and children to POPs. METHODS: We used the time-variant mechanistic model CoZMoMAN to estimate and compare prenatal, postnatal, and childhood exposure to polychlorinated biphenyl congener PCB-153 under different scenarios of maternal guideline adherence for both hypothetical constant and realistic time-variant chemical emissions. The scenarios differed in term of length of compliance (1 vs. 5 years), extent of fish substitution (all vs. half), and replacement diet (uncontaminated produce vs. beef). We also estimated potential exposure reductions for a range of theoretical chemicals to explore how guideline effectiveness varies with a chemical's partitioning and degradation properties. RESULTS: When assuming realistic time periods of advisory compliance, our findings suggest that temporarily eliminating or reducing maternal fish consumption is largely ineffective in reducing pre- and postnatal exposure to substances with long elimination half-lives in humans, especially during periods of decreasing environmental emissions. Substituting fish with beef may actually result in higher exposure to certain groups of environmental contaminants. On the other hand, advisories may be highly effective in reducing exposure to substances with elimination half-lives in humans shorter than the length of compliance. CONCLUSIONS: Our model estimates suggest that fish consumption advisories are unlikely to be effective in reducing prenatal, postnatal, and childhood exposures to compounds with long elimination half-lives in humans.

Source: Binnington, M.J., Quinn, C.L., McLachlan, M.S., Wania, F. Department of Physical and Environmental Sciences, University of Toronto Scarborough, Toronto, Ontario, Canada. "Evaluating the Effectiveness of Fish Consumption Advisories: Modeling Prenatal, Postnatal, and Childhood Exposures to Persistent Organic Pollutants." Environmental Health Perspectives. 2013 Dec 17. [Epub ahead of print].



Biomarkers of fish oil omega-3 polyunsaturated fatty acids intake in humans

A biomarker is a measured characteristic that may be used as an indicator of some biological state or condition. In health and disease, biomarkers have been used not only for clinical diagnosis purposes but also as tools to assess effectiveness of a nutrition or drug intervention. When considering nutrition studies, evaluating the appropriate biomarker is a useful tool to assess compliance and incidence of a particular dietary component in the biochemistry of the organism. Fish oil is rich in ω-3 fatty acids that have well-known beneficial effects on human health mainly through its anti-inflammatory properties. It has been widely use to improve health and as a nutrition supplement in different pathological conditions such as cardiovascular, neurological, and critically ill related diseases. Eicosapentaenoic acid and docosahexaenoic acid levels present in different biological moieties (plasma, cellular membranes, adipose tissue, etc) are the best biomarkers of fish oil intake. Each biological source of fatty acids has its own advantages and disadvantages, thus which biomarker to choose and where to measure it requires a comprehension of the objectives of the investigation. In this article we will

review key facts about fish oil intake biomarkers to evaluate how components of a specific diet could be monitored and identified in biological samples. Having an accurate assessment of nutrition patterns could provide effective targets for intervention aimed at modifying eating habits and lifestyle towards the improvement of health.

Source: Silva, V., Barazzoni, R., Singer, P. Pierre Singer, Rabin Medical Center, Beilinson Hospital, Petach Tikva, Israel. "Biomarkers of fish oil omega-3 polyunsaturated fatty acids intake in humans." Nutrition in Clinical Practice: Official Publication of the American Society for Parenteral and Enteral Nutrition. 2014 Feb;29(1):63-72.

Invasive lionfish (*Pterois volitans*): a potential human health threat for ciguatera fish poisoning in tropical waters

Invasive Indo-Pacific lionfish (*Pterois volitans*) have rapidly expanded in the Western Atlantic over the past decade and have had a significant negative impact on reef fish biodiversity, habitat, and community structure, with lionfish outcompeting native predators for resources. In an effort to reduce this population explosion, lionfish have been promoted for human consumption in the greater Caribbean region. This study examined whether the geographical expansion of the lionfish into a known ciguatera-endemic region can pose a human health threat for ciguatera fish poisoning (CFP). More than 180 lionfish were collected from waters surrounding the US Virgin Islands throughout 2010 and 2011. Ciguatoxin testing included an in vitro neuroblastoma cytotoxicity assay for composite toxicity assessment of sodium-channel toxins combined with confirmatory liquid chromatography tandem mass spectrometry. A 12% prevalence rate of ciguatoxic lionfish exceeding the FDA guidance level of 0.1 µg/kg C-CTX-1 equivalents was identified in fish from the U.S. Virgin Islands, highlighting a potential consumption risk in this region. This study presents the first evidence that the invasive lionfish, pose a direct human health risk for CFP and highlights the need for awareness and research on this food safety hazard in known endemic areas.

Source: Robertson, A., Garcia, A.C., Quintana, H.A., Smith, T.B., Ii, B.F., Reale-Munroe, K., Gulli, J.A., Olsen, D.A., Hooe-Rollman, J.I., Jester, E.L., Klimek, B.J., Plakas, S.M. Food and Drug Administration, Division of Seafood Science and Technology, Gulf Coast Seafood Laboratory, Dauphin Island, AL. "Invasive lionfish (*Pterois volitans*): a potential human health threat for ciguatera fish poisoning in tropical waters." Marine Drugs. 2013 Dec 27;12(1):88-97.

Assessment of human health risk for heavy metals in fish and shrimp collected from Subarnarekha River, India

Five fish species and one shrimp species from the Subarnarekha River were analyzed for heavy metals using inductively coupled plasma-mass spectrometry. The geometric mean concentration of As, Cd, Cu, Fe, Pb, Ni, Zn, Cr, Co, and Sr for all the samples was found to be 0.248, 0.031, 5.16, 104.9, 0.121, 4.68, 52.2, 0.784, 0.207, and 42.86 mg kg-1fresh, respectively. The concentrations of metals in the fish and shrimp exceed the limits of Indian and FAO standards for food for As, Cu, Ni, Cd, and Zn in many samples. The mean target hazard quotient (THQ) values for the 10 metals were below one for all the samples; however, the maximum THQ was more than one for shrimp in case of As, Cu, and Cr. The results indicate that the concentration of metals in some species, especially shrimp, at some locations is alarming and do present an appreciable hazard risk on human health.

Source: Giri, S., Singh, A.K. "Assessment of human health risk for heavy metals in fish and shrimp collected from Subarnarekha River, India." CSIR-Central Institute of Mining and Fuel Research, Geo-Environment Division, Dhanbad, India. International Journal of Environmental Health Research. 2013 Nov 25.

Risk assessment of trace elements in cultured freshwater fishes from Jiangxi province, China

The levels of trace elements (As, Cd, Cr, Cu, Fe, Ni, Pb, Se, and Zn) in eight species of cultured freshwater fishes from Jiangxi province were determined by inductively coupled plasma-mass spectroscopy. All the studied trace element levels in fish muscles from Jiangxi province did not exceed Chinese national standard and European Union standard, and they were often lower than previous studies. The calculated target hazard quotient values for all the studied trace elements in fish samples were much less than 1, suggesting that the studied trace elements in fish muscles from Jiangxi province had not pose obvious health hazards to consumers. As and Cd concentrations in northern snakehead were much higher than that in other fishes, demonstrating that this fish species could be valuable as a bioindicator of As and Cd in environmental surveys. In addition, the highest concentrations of Fe, Zn, and moderate contents of other essential trace elements in crucian carp indi-

cated that crucian carp could be a good nutrient source of essential trace elements for human health.

Source: Zhang, L., Zhang, D., Wei, Y., Luo, L., Dai, T. Institute for Quality & Safety and Standards of Agricultural Products Research, Jiangxi Academy of Agricultural Sciences, Nanchang, People's Republic of China. "Risk assessment of trace elements in cultured freshwater fishes from Jiangxi province, China." Environmental Monitoring and Assessment. 2013 Nov 21.

Selenium/mercury molar ratios in freshwater, marine, and commercial fish from the USA: variation, risk, and health management

Fish provide healthy protein as well as recreational and cultural benefits, but can also contain mercury (Hg), polychlorinated biphenyls (PCBs), and other contaminants that have adverse effects on humans and other organisms, particularly developing fetuses. Recently, some authors have suggested that a molar excess of selenium (Se) [e.g., selenium/mercury (Se/Hg) molar ratio >1] confers protection from Hg toxicity derived from fish consumption. Herein, we review our studies of Hg and Se in freshwater, marine, and commercial fish (mainly marine), examining the following: (1) whether and how Se/Hg molar ratios vary among species; (2) whether and how the molar ratios vary within species; (3) whether the molar ratios differ between freshwater and saltwater fish; (4) whether mean molar ratio values provide a reliable indication of potential risk to fish consumers; and (5) whether mean Se/Hg molar ratios are sufficiently constant (e.g., low variation) to allow for use in risk assessment, risk management, or risk communication. In saltwater fish, mean Se/Hg molar ratios varied from 0.3 in mako shark to 68.1 in whiting. For freshwater fish, the mean ratios varied from 0.68 in bowfin to 20.8 in black crappie. Commercial seafood (mainly saltwater) showed great variation in ratios; shrimp and scallops had very high ratios. There was somewhat less variability in the ratios for freshwater fish compared with the fish from saltwater, but there was no overall predictable difference in variation in Se/Hg molar ratios. For both saltwater and freshwater fish, some species with mean molar ratios above 1 had a significant proportion of individual fish with molar ratios below 1. Overall, this indicates great variation in measures of central tendencies and in measures of dispersion. We suggest that relying on the Se/Hg molar ratio as a method of predicting reduced risk from Hg toxicity is problematic because of the great variation among and within fish species, and the variation is not predictable because Hg varies by season, size of the fish, and location of the fish (which is not available for commercial fish). With the high variation in ratios, and low predictability, the ratios are currently not useful for risk assessment and risk management, and vulnerable individuals cannot rely on mean Se/Hg molar ratios for protection from Hg toxicity.

Source: Burger, J., Gochfeld, M. "Selenium/mercury molar ratios in freshwater, marine, and commercial fish from the USA: variation, risk, and health management." Reviews on Environmental Health. 2013;28 (2-3):129-43.

Hair mercury and fish consumption in residents of O'ahu, Hawai'i

Recent studies have established that men are susceptible to cardiotoxicity from methylmercury exposure, which also poses risks to the pregnant woman. Hair samples were obtained and questionnaires for methylmercury exposure assessment were administered to 110 adults (57 men, 53 women) throughout O'ahu, Hawai'i during December 2010 to January 2011. Hair samples were analyzed for total mercury with a direct mercury analyzer. Men ≥ 46 years had a median of 2.0 μg/g, which was above the reference dose of 1 μg/g, as compared to younger men with a median 1.0 μg/g ($P < 0.05$). Hair concentrations from older women had a median of 1.2 μg/g of mercury compared to 0.6 μg/g for younger women. Additionally, 38% of women of childbearing age had a Hazard Index > 1.0. This indicates that both men and women were at risk for excessive methylmercury exposure. In the final regression model, male gender, age > 45 years, length of residency > 10 years in Hawai'i, and fish consumption frequency > 1 meal per week were significant factors in increased hair mercury levels. Following safe fish consumption practices allows residents to reap health benefits of fish consumption without excessive toxicant exposure.

Source: Ramos, A., Quintana, P.J., Ji, M. San Diego State University Graduate School of Public Health, San Diego, CA. "Hair mercury and fish consumption in residents of O'ahu, Hawai'i." Hawaii Journal of Medicine and Public Health. 2014 Jan;73(1):19-25.

Quantitative risk-benefit analysis of fish consumption for women of child-bearing age in Hong Kong

Maternal fish consumption is associated with both risks from methylmercury (MeHg) and beneficial effects from omega-3 fatty acids to the developing foetal brain. This paper assessed the dietary exposure to MeHg of women of child-bearing age (20-49 years) in Hong Kong, and conducted risk-benefit analysis in terms of the effects in children's intelligent quotient (IQ) based on local data and the quantitative method derived by the expert consultation of FAO/WHO. Results showed that average and high consumers consume 450 and 1500 g of fish (including seafood) per week, respectively. About 11% of women of child-bearing age had a dietary exposure to MeHg exceeding the PTWI of 1.6 μg kg(-1) bw. In pregnant women MeHg intake may pose health risks to the developing foetuses. For average consumers, eating any of the 19 types of the most commonly consumed fish and seafood during pregnancy would result in 0.79-5.7 IQ points gain by their children. For high consumers, if they only ate tuna during pregnancy, it would cause 2.3 IQ points reduction in their children. The results indicated that for pregnant women the benefit outweighed the risk associated with eating fish if they consume different varieties of fish in moderation.

Source: Chen, M.Y., Wong, W.W., Chung, S.W., Tran, C.H., Chan, B.T., Ho, Y.Y., Xiao, Y. Centre for Food Safety, Food and Environmental Hygiene Department , Hong Kong Special Administrative Region , China. "Quantitative risk-benefit analysis of fish consumption for women of child-bearing age in Hong Kong." Food Additives and Contaminants. Part A, Chemistry, Analysis, Control, Exposure, and Risk Assessment. 2014 Jan;31(1):48-53.

Position of the academy of nutrition and dietetics: dietary fatty acids for healthy adults

Source: Vannice, G., Rasmussen, H. "Position of the academy of nutrition and dietetics: dietary fatty acids for healthy adults." Journal of the Academy of Nutrition and Dietetics. 2014 Jan;114(1):136-53

Contaminant Levels in Gulf of Mexico Reef Fish after the *Deepwater Horizon* Oil Spill As Measured by a Fishermen-Led Testing Program

Source: Fitzgerald, T.P. and Gohlke, J.M. Oceans Program, Environmental Defense Fund, Washington, D.C.; United States‡ Department of Environmental Health, School of Public Health, University of Alabama at Birmingham, Alabama. "Contaminant Levels in Gulf of Mexico Reef Fish after the *Deepwater Horizon* Oil Spill As Measured by a Fishermen-Led Testing Program." Environmental Science & Technology. 2014. 48 (3), pp 1993–2000.

Blood mercury concentrations in pregnant and nonpregnant women in the United States: National Health and Nutrition Examination Survey 1999-2006

Source: Razzaghi, H., Tinker, S.C., Crider, K. National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention (CDC), Atlanta, GA; Oak Ridge Institute for Science and Education, Oak Ridge, TN. "Blood mercury concentrations in pregnant and nonpregnant women in the United States: National Health and Nutrition Examination Survey 1999-2006." American Journal of Obstetrics and Gynecology. 2013 Nov 1. pii: S0002-9378(13)01994-7.

Dietary exposure to polychlorinated biphenyls is associated with increased risk of stroke in women

Source: Bergkvist, C., Kippler, M., Larsson, S.C., Berglund, M., Glynn, A., Wolk, A., Akesson, A. European Food Safety Authority (EFSA), Parma, Italy; Unit of Nutritional Epidemiology, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden "Dietary exposure to polychlorinated biphenyls is associated with increased risk of stroke in women." Journal of Internal Medicine. 2014 Jan 16.

Environmental pollutants: downgrading the fish food stock affects chronic disease risk

Source: Jacobs, D.R. Jr., Ruzzin, J., Lee, D.H. Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, MN. "Environmental pollutants: downgrading the fish food stock affects chronic disease risk." Journal of Internal Medicine. 2014 Jan 21. [Epub ahead of print].

The neurological effects of prenatal and postnatal mercury/methylmercury exposure on three-year-old children in Taiwan

Source: Hsi, H.C., Jiang, C.B., Yang, T.H., Chien, L.C. Graduate Institute of Environmental Engineering, National Taiwan University, Taiwan; Department of Pediatrics, Taipei Mackay Memorial Hospital, Taipei, Taiwan; Mackay Junior College of Medicine, Nursing and Management, Taipei, Taiwan; School of Public Health, Taipei Medical University, Taiwan. "The neurological effects of prenatal and postnatal mercury/methylmercury exposure on three-year-old children in Taiwan." Chemosphere. 2014 Jan 22. pii: S0045-6535(14)00005-8.

Organochlorine pesticides in fish from Taihu Lake, China, and associated human health risk assessment

Source: Wang, D., Yu, Y., Zhang, X., Zhang, D., Zhang, S., Wu, M. Institute of Environmental Pollution and Health, School of Environmental and Chemical Engineering, Shanghai University, Shanghai , PR China. "Organochlorine pesticides in fish from Taihu Lake, China, and associated human health risk assessment." Ecotoxicology and Environmental Safety. 2013 Dec; 98:383-9.

Determination of essential elements (copper, manganese, selenium and zinc) in

fish and shellfish samples. Risk and nutritional assessment and mercury-selenium balance

Source: Olmedo, P., Hernández, A.F., Pla, A., Femia, P., Navas-Acien, A., Gil, F. Department of Legal Medicine and Toxicology, School of Medicine, University of Granada, Spain. "Determination of essential elements (copper, manganese, selenium and zinc) in fish and shellfish samples. Risk and nutritional assessment and mercury-selenium balance." Food and Chemical Toxicology. 2013 Dec;62:299-307.

Human mercury exposure and effects in Europe

Source: Višnjevec, A.M., Kocman, D., Horvat, M. Department of Environmental Sciences, Jožef Stefan Institute, Ljubljana, Slovenia; International postgraduate School Jožef Stefan, Ljubljana, Slovenia. "Human mercury exposure and effects in Europe." Environmental Toxicology and Chemistry. 2013 Dec 4. [Epub ahead of print].

Mercury and selenium intake by seafood from the Ionian Sea: a risk evaluation

Source: Copat, C., Vinceti, M., D'Agati, M.G., Arena, G., Mauceri, V., Grasso, A., Fallico, R., Sciacca, S., Ferrante, M. Environmental and Food Hygiene Laboratory (LIAA), Department of Hygiene and Public Health, University of Catania, Catania, Italy; Department of Diagnostic and Clinical Medicine and of Public Health, University of Modena and Reggio Emilia, Modena, Italy. "Mercury and selenium intake by seafood from the Ionian Sea: a risk evaluation." Ecotoxicology and Environmental Safety. 2014 Feb; 100:87-92.

Arsenolipids show different profiles in muscle tissues of four commercial fish species

Source: Amayo, K.O., Raab, A., Krupp, E.M., Marschall, T., Horsfall, M. Jr., Feldmann, J. Trace Element Speciation Laboratory (TESLA), Department of Chemistry, Meston Walk, University of Aberdeen, Scotland, UK; Central Instrument Laboratory (CIL), Department of Pure & Industrial Chemistry, University of Port Harcourt, Nigeria. "Arsenolipids show different profiles in muscle tissues of four commercial fish species." Journal of Trace Elements in Medicine and Biology. 2013 Nov 23. pii: S0946-672X(13)00167-3.

Spatial variability in selenium and mercury interactions in a key recreational fish species: implications for human health and environmental monitoring

Source: Jones, H.J., Butler, E.C., Macleod, C.K. Institute for Marine and Antarctic Studies, University of Tasmania, Australia. "Spatial variability in selenium and mercury interactions in a key recreational fish species: implications for human health and environmental monitoring." Marine Pollution Bulletin. 2013 Sep 15; 74(1):231-6.

Healthy aging diets other than the Mediterranean: a focus on the Okinawan diet

Source: Willcox, D.C., Scapagnini, G., Willcox, B.J. "Healthy aging diets other than the Mediterranean: a focus on the Okinawan diet." Mechanisms of Ageing and Development. 2014 Jan 21. pii: S0047-6374(14)00003-7.

Back to the future: the Mediterranean diet paradigm

Source: Naska, A., Trichopoulou, A. Department of Hygiene, Epidemiology and Medical Statistics, School of Medicine, National and Kapodistrian University of Athens, Athens, Greece; Hellenic Health Foundation, Athens, Greece. "Back to the future: the Mediterranean diet paradigm." Nutrition, Metabolism, and Cardiovascular Diseases. 2013 Dec 16. pii: S0939-4753(13)00302-5.

White fish reduces cardiovascular risk factors in patients with metabolic syndrome: The WISH-CARE study, a multicenter randomized clinical trial

Source: Vázquez, C., Botella-Carretero, J.I., Corella, D., Fiol, M., Lage, M., Lurbe, E., Richart, C., Fernández-Real, J.M., Fuentes, F., Ordóñez, A., de Cos, A.I., Salas-Salvadó, J., Burguera, B., Estruch, R., Ros, E., Pastor, O., Casanueva, F.F., the WISH-CARE Study Investigators. "White fish reduces cardiovascular risk factors in patients with metabolic syndrome: The WISH-CARE study, a multicenter randomized clinical trial." Nutrition, Metabolism, and Cardiovascular Diseases. 2013 Nov 1. pii: S0939-4753(13)00266-4.

The potential of cod hydrolyzate to inhibit blood pressure in spontaneously hypertensive rats

Source: Jensen, I.J., Eysturskarð, J., Madetoja, M., Eilertsen, K.E. Faculty of Biosciences, Fisheries and Economics, UiT The Arctic University of Norway, Norway; Aquaculture Research Station of the Faroes, Faroe Islands; Made Consulting, Piikkio, Finland. "The potential of cod hydrolyzate to inhibit blood pressure in spontaneously hypertensive rats." Nutrition Research. 2014 Feb; 34(2):168-73.

Special lipid-based diets alleviate cognitive deficits in the APPswe/PS1dE9 transgenic mouse model of Alzheimer's disease independent of brain amyloid deposition

Source: Koivisto, H., Grimm, M.O., Rothhaar, T.L., Berkecz, R., Lütjohann, D., Giniatullina, R., Takalo M., Miettinen, P.O., Lahtinen, H.M., Giniatullin, R., Penke, B., Janáky, T., Broersen, L.M., Hartmann, T., Tanila, H. "Special lipid-based diets alleviate cognitive deficits in the APPswe/PS1dE9 transgenic mouse model of Alzheimer's disease independent of brain amyloid deposition." The Journal of Nutritional Biochemistry. 2014 Feb; 25(2):157-69.

Fish intake and venous thromboembolism: a Danish follow-up study

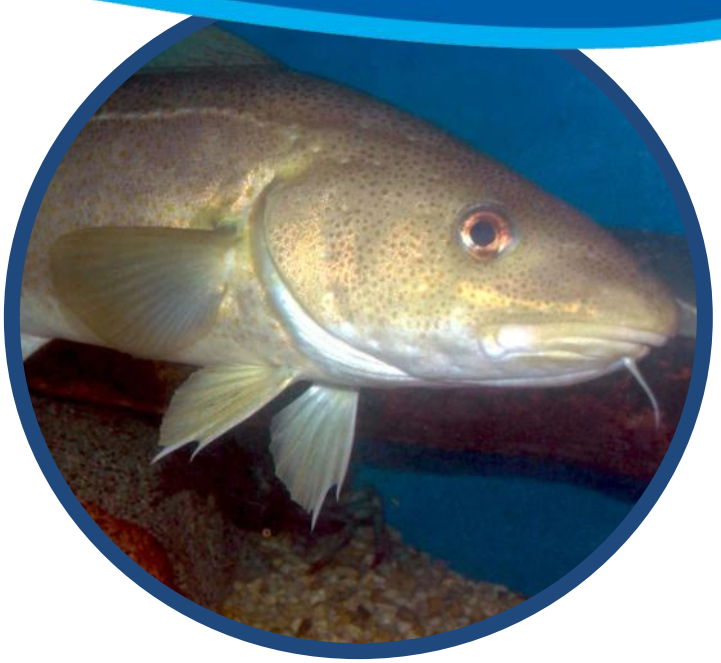
Source: Severinsen, M.T., Overvad, K., Andersen, V.L., Tjønneland, A., Schmidt, E.B., Kristensen, S.R.. Aalborg University Hospital, Aalborg, Denmark; Institute of Cancer Epidemiology, Danish Cancer Society, Copenhagen, Denmark. "Fish intake and venous thromboembolism: a Danish follow-up study." Thrombosis Research 2013 Dec 31. pii: S0049-3848(13)00604-X.

Long-chain polyunsaturated fatty acid supplementation had no effect on body weight but reduced energy intake in overweight and obese women

Source: Harden, C.J., Dible, V.A., Russell, J.M., Garaiova, I., Plummer, S.F., Barker, M.E., Corfe, B.M. Molecular Gastroenterology Research Group, Academic Unit of Surgical Oncology, Department of Oncology, The University of Sheffield, Sheffield, UK; Corporate Information and Computing Services, The University of Sheffield, Sheffield, UK; Obsidian Research Ltd, Port Talbot, West Glamorgan, UK; Human Nutrition Unit, Department of Oncology, The University of Sheffield, Sheffield, UK. Nutrition Research. 2014 Jan;34(1):17-24.

Diets to prevent coronary heart disease 1957- 2013: what have we learned?

Source: Dalen, J.E., Devries, S. Weil Foundation, and University of Arizona College of Medicine, Tucson, Arizona; Gaples Institute for Integrative Cardiology, Deerfield, Illinois and Division of Cardiology, Northwestern University, Chicago, Illinois. "Diets to prevent coronary heart disease 1957- 2013: what have we learned?" The American Journal of Medicine. 2013 Dec 30. pii: S0002-9343(13)01111-X.



Persistent organic pollutants in marine fish from Yongxing Island, South China Sea: levels, composition profiles and human dietary exposure assessment

Source: Sun, Y.X., Hao, Q., Xu, X.R., Luo, X.J., Wang, S.L., Zhang, Z.W., Mai, B.X. Key Laboratory of Tropical Marine Bio-Resources and Ecology, South China Sea Institute of Oceanology, Chinese Academy of Sciences, Guangzhou, China; State Key Laboratory of Organic Geochemistry, Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, Guangzhou, China. "Persistent organic pollutants in marine fish from Yongxing Island, South China Sea: levels, composition profiles and human dietary exposure assessment." Chemosphere. 2013 Nov 5. pii: S0045-6535(13)01389-1.

Additional Information

For more information about specific advisories within a state, contact the appropriate state agency listed on EPA's NLFA website at http://fishadvisoryonline.epa.gov/

For more information about the NLFA or EPA's Fish Advisory Program, contact:

The NLFA Newsletter at Fish_Advisory@epa.gov or
Jeff Bigler, National Program Manager, Fish Advisory Program

Telephone: 202.566.0389
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