December 2013

National Listing of Fish Advisories NEWSLETTER

Recent Advisory News

Researchers: Fish from Vietnam and China contain formaldehyde

Recent tests show that a number of fish from Vietnam and China contain formaldehyde, which has been known to cause cancer. The study showed 25% of tested fish in supermarkets contained the carcinogen, and all of the fish in that 25% were from Asia. The levels of the carcinogen found in the fish are unnatural according to an article in Food Safety News. Researchers from a North Carolina chemical engineering firm and North Carolina State University conducted the tests on fish purchased in the Raleigh, North Carolina area. While it is illegal for formaldehyde to be present in food in more than trace amounts, the U.S. Food and Drug Administration (FDA) does not test for formaldehyde. The FDA only tests 4% of imported fish for contaminants. The United States imports approximately 91% of its seafood, and China produces 89% of the world's aquaculture. The FDA commented that it seeks "to ensure that both domestic and imported seafood is safe and that we are protecting consumers from products that can cause illness," and urges anyone who believes a food item violates food safety laws to contact them. Link to original article: http://www.digitaljournal.com/article/359888.

Source: White, Mike. Digital Journal. 10/08/2013.

Hair testing shows worldwide exposure to mercury

A new Zero Mercury Working Group (ZMWG) report revealed that hair samples from women in several of the nine countries sampled had higher mercury levels, which correlates to fish consumption rates. Twenty-four percent of the hair samples exceeded the U.S. Environmental Protection Agency (EPA) guideline of 1 micrograms per gram of mercury. In four of the countries, a high percentage of women exceeded the threshold: 71% in Japan; 64% in Spain; 36% in Mauritius; and 23% in Cote d'Ivoire. Most exposure studies have been conducted in developed countries and much less is known about exposures in other regions, underscoring the importance of expanding the ZMWG's capacity to assess exposure worldwide. The report notes that the situation from country to country is highly variable and seems to be affected by multiple factors, including amounts and types of fish consumed and family income. Link to original article: http://www.pollutiononline.com/doc/in-advance-treaty-adoption-hair-testing-worldwide-exposure-mercury-0001.

Source: Zero Mercury Working Group. www.pollutiononline.com. 10/01/2013.

Fish guidelines for pregnant women may be too strict, study suggests

The health benefits of eating fish are well-known, but pregnant women are still advised to limit their consumption of fish. The United States government advises pregnant women to limit their intake of fish to no more than 12 ounces of seafood like salmon and shrimp per week, and to avoid bigger fish such as swordfish and shark. New research at the University of Bristol in England suggests that this advice might be too restrictive, as fish consumption only accounts for 7% of the mercury in a person's body. This study analyzed 103 types of food and drink consumed by more than 4,000 expectant mothers and submitted the participants' blood samples to the U.S. Centers for Disease Control and Prevention for analysis. Results showed a broad range of mercury levels, ranging from as little as 0.17

micrograms per liter to levels as high as 12.8 micrograms per liter, supporting the conclusion that the 103 food types contributed approximately 17% to the range in blood mercury levels. The seafood items assessed (white fish, oily fish, and shellfish) were the biggest dietary contributors to the variation; however, herbal teas, alcohol, white rice, and fresh fruit were also associated with higher levels of blood mercury. Diet is only one of various sources of mercury exposure, so pregnant women cannot completely avoid exposure. Researchers believe these results highlight the importance of maintaining a balanced diet while pregnant. Link to original article: http://www.npr.org/blogs/thesalt/2013/10/02/228526965/fish-guidelines-for-pregnant-women-may-be-too-strict-study-suggests.

Source: Singh, Maanvi. The Salt – NPR. 10/02/2013.

Columbia River's contaminated 'resident' fish dangerous, say Oregon health authorities

Officials have advised the public not to consume fish that live year-round just above Bonneville Dam on the Columbia River and to limit the consumption of so-called resident fish (i.e., bass, bluegill, yellow perch, crappie, walleye, carp, catfish, suckers, and sturgeon) in a 150-mile stretch upstream from Bonneville Dam, following the discovery of high levels of contaminants in the fish. This advisory does not affect migratory fish, such as salmon, steelhead trout, American shad, and lamprey, but it does include sturgeon and walleye, two species popular with tribes. Tests conducted on Columbia River fish collected in August 2011 yielded surprising results. Tests showed PCB levels of 183 ppm, higher than any levels previously observed, and far higher than the U.S. health advisory threshold of 0.047 ppm. Smallmouth bass tested near the Bonneville Dam also possessed elevated levels of mercury (0.26 ppm) in excess of the advisory threshold of 0.20 ppm. Fish farther upstream were also contaminated with mercury and had slightly elevated levels of PCBs. People should not consume any resident fish caught between Bonneville Dam and Ruckle Creek, and should limit consumption of resident fish taken between Ruckle Creek and McNary Dam to one meal a week or four meals a month. Link to original article: http://www.oregonlive.com/health/index.ssf/2013/09/columbia_rivers_contaminated_r.html.

Source: Terry, Lynne. The Oregonian. 9/23/2013.

Study links warmer water temperatures to greater levels of mercury in fish

Researchers recently observed an increase in killifish metabolism and appetite in response to warmer water temperatures. A field experiment in a network of salt pools revealed that as killifish in the warmer pools ate their natural food, they stored metal in even higher concentrations, becoming increasingly toxic for larger fish that prey on them. This research was part of a larger study that demonstrated that killifish, at the bottom of the food chain, will probably absorb higher levels of methylmercury in an era of global warming and warmer waters and pass on toxins to larger predator fish, such as tuna. "The implication is this could play out in larger fish. . . because their metabolic rate is also increasing," said Celia Chen, a professor at Dartmouth College in New Hampshire and one of six authors of the study. "Methylmercury isn't easily excreted, so it stays. It suggests that there will be higher methylmercury concentrations in the fish humans eat as well." Link to original article: http://www.washingtonpost.com/national/health-science/study-links-warmer-water-temperatures-to-greater-levels-of-mercury-in-fish/2013/10/13/c86d43c6-3113-11e3-9c68-1cf643210300_story.html?hpid=z5.

Source: Fears, Darryl. The Washington Post. 10/13/2013.

Fish exceed mercury levels in east Iowa

The Iowa Department of Natural Resources (DNR) has confirmed the presence of mercury in excess of consumption advisory levels in bass and walleye collected from Lake Iowa, the Turkey River near Garber, and the Iowa River near Marshalltown. The DNR and Iowa Department of Public Health (IDPH) recommend that the public consume no more than one meal (6 to 7 ounces) per week of bass, walleye, or other predator fish caught from the following waters: Lake Iowa in Iowa County near Millersburg; Turkey River in Clayton County from its confluence with the Mississippi River 21 miles upstream to confluence with the Volga River near Garber; and Iowa River from the upper end of Coralville Reservoir at Highway 218 in Johnson County 178 miles upriver to the dam at Iowa Falls in Hardin County. In addition, individuals are advised to consume no more than one meal (6 to 7 ounces) per week of muscle tissue from snapping turtles taken from Pollmiller Park Lake in Lee County, and not to consume turtle fat.

Conferences

Aquaculture America 2014 – The World Aquaculture Society
February 9-12, 2014, Seattle, Washington
http://www.marevent.com/AA14seattle.html

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/

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

This recent advisory raises the number of consumption advisories in Iowa to 22. The complete list of Iowa's fish consumption advisories is available online at: www.iowadnr.gov/Environment/WaterQuality/WaterMonitoring/MonitoringPrograms/FishTissueMonitoring.aspx. Link to original article: http://globegazette.com/fish-exceed-mercury-levels-in-east-iowa/article_cbea131e-789c-5050-8e11-f1ae3a79e4aa.html.

Source: Iowa Department of Natural Resources. The Globe Gazette. 10/16/2013.

Agencies advise limited consumption of some fish species below mill site on Clark Fork River in western Montana

Fish consumption advisories have been issued by the Montana Departments of Fish, Wildlife & Parks, Environmental Quality, and Public Health and Human Services for northern pike and rainbow trout along a 105-mile stretch of the Clark Fork River in western Montana. A "do not eat" advisory was issued for the northern pike, and a "four meal per month" limit was issued for rainbow trout. This advisory extends from the Clark Fork River's confluence with the Bitterroot River, near Missoula, to the confluence with the Flathead River, near Paradise. These advisories were issued in response to contaminant investigations immediately downstream of the Smurfit Stone Container mill site in Frenchtown that revealed dioxins, furans, and polychlorinated biphenyls (PCBs) in northern pike and rainbow trout taken from the river. Northern pike had potentially dangerous levels of the three chemicals. Contaminant levels were higher in northern pike than the rainbow trout because they live longer, grow larger, and eat other fish. Contaminant levels in other species of fish from the Clark Fork River have not been studied at this time. Link to original article: http://fwp.mt.gov/news/newsReleases/fishing/nr_0797.html.

Source: Montana Fish, Wildlife, & Parks. 10/17/2013.

Advisories on eating fish from local lakes may not be reaching all

The Wisconsin Department of Natural Resources (DNR) has issued recommendations that the public limit their consumption of fish caught in Madison lakes, as mercury and polychlorinated biphenyls (PCBs) are two main concerns in fish caught in these waterbodies. However, many believe

these recommendations do not reach low-income and minority groups who are more likely to eat fish from the city's lakes. In addition, fish advisory programs have been cut due to limited financial resources, continuing the debate over how well consumption warnings are reaching the fishing community. DNR includes health advisories in the fish regulation booklets that are issued to fishermen with their fishing licenses. Warning signs were posted at popular fishing locations in Madison to increase advisory awareness while personnel surveyed their effectiveness. A survey conducted by DNR found that the majority of whites and Hispanics read the signs, compared to less than half of African Americans and Hmong. This survey also demonstrated a gap between whites and other minorities, in that 74% of non-white anglers consumed their catch compared to 29% of whites. This survey revealed that the different groups also acquire their information differently, with non-white participants relying less on mass media (e.g., newspapers, television, and internet) than white participants. Information gathered during this survey indicates that the most effective outreach is person to person. Link to original article: http://downtownmadison.channel3000.com/news/arts-culture/224642-advisories-eating-fish-local-lakes-may-not-be-reaching-all.

Source: Peng, Yilang. downtownmadison.channel3000.com. 10/18/2013.

Delaware issues updated fish consumption advisory

The Delaware Department of Natural Resources and Environmental Control (DNREC) and the Department of Health and Social Services' Division of Public Health have updated the fish consumption advisory for fish caught in the tidal Delaware River. The fish consumption advisory for the tidal Delaware River from the Delaware/Pennsylvania/New Jersey border to the C&D Canal has been updated to a less restrictive advisory due to reduced levels of polychlorinated biphenyls (PCBs), dioxins and furans, chlorinated pesticides, and mercury. For the general adult population, the advisory has been changed from "eat no finfish caught in the tidal Delaware River north of the C&D Canal" to "eat no more than one eight ounce meal of finfish per year." Women of childbearing age and young children are still advised to "not eat" fish caught in this area. People who choose to eat species under advisories can take steps to reduce exposure through proper cleaning and cooking techniques, which can significantly reduce levels of PCBs, dioxins, chlorinated pesticides and other organic chemicals. DNREC Secretary Collin O'Mara notes that, "This updated advisory in the tidal Delaware River is a very positive sign that water quality is improving and that our efforts, especially during the past few years, are working." The revised fish consumption advisories chart with meal advice for fish caught in Delaware waterways and information on the monitoring program can be found on DNREC's web site at: http://www.fw.delaware.gov/Fisheries/Pages/Advisories.aspx. Link to original article: http://news.delaware.gov/2013/10/23/delaware-issues-updated-fish-consumption-advisory/.

Source: News.delaware.gov. 10/23/2013.

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.

An ecologically framed mercury survey of finfish of the lower Chesapeake Bay

Total mercury (THg) and methylmercury (MHg) concentrations and determents of mercury (Hg) accumulation were examined for muscle tissues of 10 finfish from the lower Chesapeake Bay (LCB) and its tributaries. There was no suggestion of potential human harm from Hg due to LCB fish consumption: None of the sampled fish had THg concentrations approaching the United States Environmental Protection Agency human health screening value. Hg concentrations in different fish species generally in-

creased with the increasing stable isotope of nitrogen 15 (δ (15)N) but not the stable isotope of carbon 13 (δ(13)C), thus suggesting that trophic position but not dietary carbon source is a dominant determinant. A MHg biomagnification model was built to estimate a food web magnification factor of approximately 10-fold increase per trophic level. Based on otolith strontium-to-calcium ratios, Atlantic croaker inhabiting less saline waters might accumulate more Hg than those inhabiting more saline waters. The SAS mixed procedure identified significant positive intraspecies relationships between MHg concentration and δ(13) C for summer flounder, weakfish, American eel, Atlantic croaker, and spot.

Source: Xu, X., Newman, M.C., Fabrizio, M.C., Liang, L. Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, VA. "An ecologically framed mercury survey of finfish of the lower Chesapeake Bay." Archives of Environmental Contamination and Toxicology 65(3):510-20.

Public health benefits and risks of fish consumption: current scientific evidence v. media coverage

OBJECTIVE: To evaluate if and how the current degree of scientific uncertainty about the safety of fish consumption is incorporated at the media level. DESIGN: We used a dedicated software (TalTac®) to investigate the content of 169 news articles related to mercury and fish consumption that appeared from 1990 to 2010 in the two Italian broadsheets with the highest circulation figures, in order to identify journalistic frames used in the coverage of benefits v. risks associated with fish consumption. Hypotheses were made on how the public might change fish consumption patterns as a result of media coverage. SETTING: Italy. RESULTS: The two newspapers have different agendas in covering the issue. La Repubblica appears to support the view that, besides health benefits, there may be risks associated with fish consumption, while Corriere della Sera emphasizes health benefits more than possible risks. Depending on the preferred information source, the public could: (i) reduce its fish intake; (ii) increase its fish intake; or (iii) become confused about the problem and skeptical towards the media, as a result of conflicting journalistic frames. CONCLUSIONS: The Italian media, in cooperation with scientists, public health nutritionists and dietitians, should place more emphasis on the existence of a few fish species with high to very high Hg levels and relatively low contents of beneficial n-3 fatty acids (e.g. swordfish and shark). This would enable consumers to make more educated purchasing decisions to maximize the benefits of n-3 intake while reducing possible risks from consuming Hg-contaminated fish.

Source: Pasquaré, F.A., Bettinetti, R., Fumagalli, S., Vignati D.A. Department of Theoretical and Applied Sciences, Insubria University, Varese, Italy. "Public health benefits and risks of fish consumption: current scientific evidence v. media coverage." Public Health Nutrition 16(10):1885-92.

Comparison of patterns and knowledge of benefits and warnings of fish consumption between parents and children

We examined generational differences in fish consumption and knowledge of benefits/warnings of fish consumption among parents and children. This cross-sectional study gathered self-administered questionnaire data, including demographics, fish consumption behavior (including specific fish species) and knowledge of fish consumption warnings and benefits. Fish were later grouped into four categories by potential mercury contamination. Descriptive statistics were conducted for all variables comparing all adults and children. Benefit/risk knowledge variables were also descriptively analyzed among parent-child pairs only. Multivariate Poisson regression was conducted on pairs to assess risk factors for children eating higher mercury fish. 421 adults and 207 children (171 adult-child pairs) participated (family response rate: 71%). Slightly more adults (97.6%) ate fish in the last year than children (92.3 %); however, there was no difference between consumption of fish by category of potential mercury contamination. Both adults (44%) and children (45%) ate high-mercury fish. In 71% of parent-child pairs, both the parent and the child knew of benefits of consuming fish; only 31% knew of warnings. Parental consumption of high or moderately-high-mercury fish was related to the child's consumption of fish in the same category. Parents and children need additional education to make better choices about fish consumption. Education should target the family and include specifics about benefits and risks.

Source: Herdt-Losavio, M.L., Lin, S., Chen, M., Luo, M., Tang, J., Hwang, S.A. New York State Department of Health, Center for Environmental Health, Bureau of Environmental and Occupational Epidemiology, Albany, NY. "Comparison of Patterns and Knowledge of Benefits and Warnings of Fish Consumption Between Parents and Children." Maternal and Child Health Journal. [Epub ahead of print].

The effects of fish oil consumption on cardiovascular remodeling in ApoE deficient mice

Owing to their spontaneous development of atherosclerosis, apolipoprotein E knockout mice (ApoE(KO)) are one of the best studied animal models for this disease. Little is known about the utility of various omega-3 fatty acid regimens, in particular fish oils, in preventing cardiac disease in ApoE(KO) mice. The purpose of this study was to determine the cardiovascular effects of omega-3 fatty acid supplementation with either safflower oil (control), fish oil, flaxseed oil, or designed oil in ApoE(KO) mice fed a high-fat diet for a total of 16 weeks. In-vivo cardiac function was assessed weekly using murine echocardiography. Blood pressure, plasma lipid levels, and brain natriuretic peptide (BNP) were serially measured. The results show that ApoE(KO) mice fed fish oil demonstrated an increase in left ventricular wall thickness as a result of increased afterload. Despite chronic treatment with fish oil over 16 weeks, blood pressure increased in ApoE(KO) mice by 20% compared with the baseline. Both echocardiographic evidence of left ventricular hypertrophy and biochemical increase in BNP levels confirmed diastolic dysfunction in ApoE(KO) mice fed fish oil. This suggests that high-fat diet supplemented with fish oil may lead to adverse cardiovascular effects in ApoE deficient mice.

Source: Cleverley, K., Du, X., Premecz, S., Le, K., Zeglinski, M., Nicholson, T., Goh, C.Y., Lu, Y., Anderson, H.D., Moghadasian, M.H., Jassal, D.S. Institute of Cardiovascular Sciences, St. Boniface Research Centre, University of Manitoba, Winnipeg, Manitoba, Canada. "The effects of fish oil consumption on cardiovascular remodeling in ApoE deficient mice." Canadian Journal of Physiology & Pharmacology 91 (11):960-5.

Perfluoroalkyl substances (PFASs) in food and water from Faroe Islands

Diet and drinking water are suggested to be major exposure pathways for perfluoroalkyl substances (PFASs). In this study, food items and water from Faroe Islands sampled in 2011/2012 were analyzed for 11 perfluoroalkyl carboxylic acids (PFCAs) and 4 perfluoroalkane sulfonic acids (PFSAs). The food samples included milk, yoghurt, crème fraiche, potatoes, fish, and fish feed, and the water samples included surface water and purified drinking water. In total, nine PFCAs and four PFSAs were detected. Generally, the levels of PFAS were in the lower picogram per gram range. Perfluorobutanoic acid was a major contributor to the total PFASs concentration in water samples and had a mean concentration of 750 pg/L. Perfluoroundecanoic acid (PFUnDA) was predominating in milk and wild fish with mean concentrations of 170 pg/g. Perfluorooctane sulfonic acid (PFOS) was most frequently detected in food items followed by PFUnDA, perfluorononanoic acid, and perfluorooctanoic acid (PFOA). Levels of PFUnDA and PFOA exceeded those of PFOS in milk and fish samples. Prevalence of long-chain PFCAs in Faroese food items and water is confirming earlier observations of their increase in Arctic biota. Predominance of short-chain and long-chain homologues indicates exposure from PFOS and PFOA replacement compounds.

Source: Eriksson, U., Kärrman, A., Rotander, A., Mikkelsen, B., Dam, M. Man-Technology-Environment (MTM) Research Centre, School of Science and Technology, Örebro University, Sweden. "Perfluoroalkyl substances (PFASs) in food and water from Faroe Islands." Environmental Science and Pollution Research International 20(11):7940-8.

Ecologic correlations of selected food groups with disease incidence and mortality in Switzerland

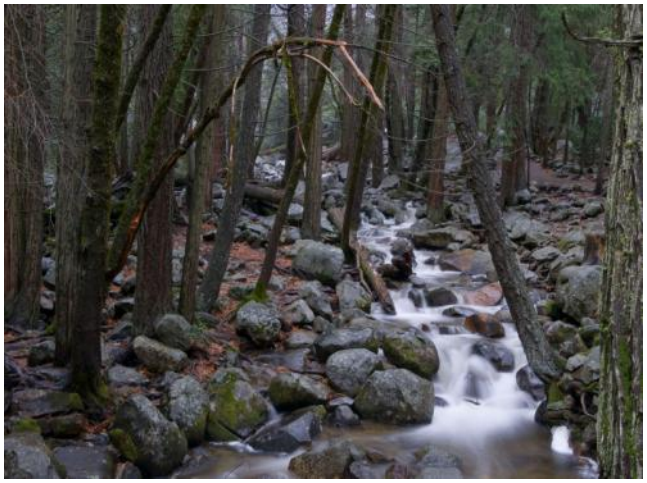
Background: There is little information regarding the impact of diet on disease incidence and mortality in Switzerland. We assessed ecologic correlations between food availability and disease. Methods: In this ecologic study for the period 1970-2009, food availability was measured using the food balance sheets of the Food and Agriculture Organization of the United Nations. Standardized mortality rates (SMRs) were obtained from the Swiss Federal Office of Statistics. Cancer incidence data were obtained from the World Health Organization Health For All database and the Vaud Cancer Registry. Associations between food availability and mortality/incidence were assessed at lags 0, 5, 10, and 15 years by multivariate regression adjusted for total caloric intake. Results: Alcoholic beverages and fruit availability were positively associated, and fish availability was inversely associated, with SMRs for cardiovascular diseases. Animal products, meat, and animal fats were positively associated with the SMR for ischemic heart disease only. For cancer, the results of analysis using SMRs and incidence rates were contradictory. Alcoholic beverages and fruits were positively associated with SMRs for all cancer but inversely associated with all-cancer incidence rates. Similar findings were obtained for all other foods except vegetables, which were weakly inversely associated with SMRs and incidence rates. Use of a 15-year lag reversed

the associations with animal and vegetal products, weakened the association with alcohol and fruits, and strengthened the association with fish. Conclusions: Ecologic associations between food availability and disease vary considerably on the basis of whether mortality or incidence rates are used in the analysis. Great care is thus necessary when interpreting our results.

Source: Besson, H., Paccaud, F., Marques-Vidal, P. Institute of Social and Preventive Medicine (IUMSP), Lausanne University Hospital. "Ecologic Correlations of Selected Food Groups With Disease Incidence and Mortality in Switzerland." Journal of Epidemiology / Japan Epidemiological Association. [Epub ahead of print].

Fish oil alleviates activation of the hypothalamic-pituitary-adrenal axis associated with inhibition of TLR4 and NOD signaling pathways in weaned piglets after a lipopolysaccharide challenge

Long-chain n-3 (ω-3) polyunsaturated fatty acids exert beneficial effects in neuroendocrine dysfunctions in animal models and clinical trials. However, the mechanism(s) underlying the beneficial effects remains to be elucidated. We hypothesized that dietary treatment with fish oil (FO) could mitigate LPS-induced activation of the hypothalamic-pituitary-adrenal (HPA) axis through inhibition of Toll-like receptor 4 and nucleotide-binding oligomerization domain protein signaling pathways. Twenty-four weaned pigs were used in a 2 × 2 factorial design, and the main factors consisted of diet (5% corn oil vs. 5% FO) and immunological challenge (saline vs. LPS). After 21 d of dietary treatment with 5% corn oil or FO diets, pigs were treated with saline or LPS. Blood samples were collected at 0 (preinjection), 2, and 4 h postinjection, and then pigs were humanely killed by intravenous injection of 40 mg/kg body weight sodium pentobarbital for tissue sample collection. FO led to enrichment of eicosapentaenoic acid and docosahexaenoic acid and total n-3 polyunsaturated fatty acids in hypothalamus, pituitary gland, adrenal gland, spleen, and thymus. FO decreased plasma adrenocorticotrophin and cortisol concentrations as well as mRNA expressions of hypothalamic corticotropin releasing hormone and pituitary proopiomelanocortin. FO also reduced mRNA expression of tumor necrosis factor-α in hypothalamus, adrenal gland, spleen, and thymus, and of cyclooxygenase 2 in hypothalamus. Moreover, FO downregulated the mRNA expressions of Toll-like receptor 4 (TLR4) and its downstream molecules, including cluster differentiation factor 14, myeloid differentiation factor 2, myeloid differentiation factor 88, interleukin-1 receptor-associated kinase 1, tumor necrosis factor-α receptor-associated factor 6, and nuclear factor kappa-light-chain-enhancer of activated B cells p65, and also decreased the mRNA expressions of nucleotide-binding oligomerization domain 1, nucleotide-binding oligomerization domain 2, and their adaptor molecule receptor-interacting serine/threonine-protein kinase 2. These results suggested that FO attenuates the activation of the HPA axis induced by LPS challenge. The beneficial effects of FO on the HPA axis may be associated with decreasing the production of brain or peripheral proinflammatory cytokines through inhibition of TLR4 and nucleotide-binding oligomerization domain protein signaling pathways.



Source: Liu, Y., Chen, F., Li, Q., Odle, J., Lin, X., Zhu, H., Pi, D., Hou, Y., Hong, Y., Shi, H. Hubei Key Laboratory of Animal Nutrition and Feed Science, Wuhan Polytechnic University, Wuhan, China. "Fish Oil Alleviates Activation of the Hypothalamic-Pituitary-Adrenal Axis Associated with Inhibition of TLR4 and NOD Signaling Pathways in Weaned Piglets after a Lipopolysaccharide Challenge." The Journal of Nutrition 143(11):1799-807.

Relationship between diet quality and cognition depends on socioeconomic position in healthy older adults

Both diet quality and socioeconomic position (SEP) have been linked to age-related cognitive changes, but there is little understanding of how the socioeconomic context of dietary intake may shape its cognitive impact. We examined whether equal adherence to "prudent" and "Western" dietary patterns, identified by principal components analysis, was associated with global cognitive function [Modified Mini-Mental State Examination (3MS)] in independently living older adults with different SEPs (aged 68-84 y; n =

1099). The interaction of dietary pattern adherence with household income, educational attainment, occupational prestige, and a composite indicator of SEP combining all 3 was examined in multiple-adjusted mixed models over 3 y of follow-up in participants of the NuAge study (Quebec Longitudinal Study on Nutrition and Successful Aging). Adherence to the prudent pattern (vegetables, fruits, fish, poultry, and lower-fat dairy products) was related to higher 3MS scores at recruitment only in the upper categories of income [parameter estimate (B): 0.56; 95% CI: 0.11, 1.01], education (B: 0.44; 95% CI: 0.080, 0.80), or composite SEP (B: 0.37; 95% CI: 0.045, 0.70). High prudent pattern adherence was associated with less cognitive decline only in those with low composite SEP (B: 0.25; 95% CI: 0.0094, 0.50). Conversely, adherence to the Western pattern (meats, potatoes, processed foods, and higher-fat dairy products) was associated with more cognitive decline (B: -0.23; 95% CI: -0.43, -0.032) only in those with low educational attainment. In summary, among individuals with equivalent diet quality, the magnitude and characteristics of the diet-cognition relationship depended on their socioeconomic circumstances. These results suggest that interventions promoting retention of cognitive function through improved diet quality would provide maximum benefit to those with relatively low SEP.

Source: Parrott, M.D., Shatenstein, B., Ferland, G., Payette, H., Morais, J.A., Belleville, S., Kergoat, M.J., Gaudreau, P., Greenwood, C.E. Rotman Research Institute, Baycrest, Toronto, Canada. "Relationship between Diet Quality and Cognition Depends on Socioeconomic Position in Healthy Older Adults." The Journal of Nutrition 143(11):1767-73.

Effect of salmon consumption during pregnancy on maternal and infant faecal microbiota, secretory IgA and calprotectin

The gut microbiota plays an important role in the development of the immune and gastrointestinal systems of infants. In the present study, we investigated whether increased salmon consumption during pregnancy, maternal weight gain during pregnancy or mode of infant feeding alter the markers of gut immune defence and inflammation. Women (n 123) who rarely ate oily fish were randomly assigned to continue consuming their habitual diet or to consume two 150g portions of farmed salmon per week from 20 weeks of pregnancy to delivery. Faecal samples were collected from the mothers (n 75) at 38 weeks of gestation and from their infants (n 38) on days 7, 14, 28 and 84 postpartum. Fluorescence in situ hybridisation was used to determine faecal microbiota composition and ELISA to measure faecal secretory IgA (sIgA) and calprotectin concentrations. There was no effect of salmon consumption on maternal faecal microbiota or on maternal or infant faecal sIgA and calprotectin concentrations. The degree of weight gain influenced maternal faecal microbiota, and the mode of infant feeding influenced infant faecal microbiota. Faecal samples collected from infants in the salmon group tended to have lower bacterial counts of the Atopobium cluster compared with those collected from infants in the control group (P= 0·097). This difference was significant in the formula-fed infants (P< 0·05), but not in the exclusively breast-fed infants. In conclusion, the impact of oily fish consumption during pregnancy on maternal and infant gut microbiota composition is limited, but significant differences are associated with maternal weight gain during pregnancy and mode of infant feeding.

Source: Urwin, H.J., Miles, E.A., Noakes, P.S., Kremmyda, L.S., Vlachava, M., Diaper, N.D., Godfrey, K.M., Calder, P.C., Vulevic, J., Yaqoob, P. Hugh Sinclair Unit of Human Nutrition, Department of Food and Nutritional Sciences, The University of Reading, UK. "Effect of salmon consumption during pregnancy on maternal and infant faecal microbiota, secretory IgA and calprotectin." The British Journal of Nutrition. [Epub ahead of print].

Supplementation with fish oil as a source of n-3 fatty acids does not downregulate mammary lipogenesis in lactating mice

The very long chain n-3 (ω-3) polyunsaturated fatty acids (VLCn3PUFAs) are potent regulators of hepatic lipid synthesis, but their effect on lipid synthesis in the lactating mammary gland is less well investigated. The objective of the present study was to examine effects of fish oil (FO) supplementation on mammary lipogenesis and the expression of lipogenic genes in mammary and hepatic tissues of lactating mice. Beginning on day 6 of lactation and continuing for 7 d, female C57BL/6J mice (n = 8/diet) were fed 1 of 3 dietary treatments: a 5%-fat diet containing mainly saturated fatty acids (FAs) (low-fat control) or 2 10%-fat diets, 1 enriched with FO as a source of VLCn3PUFAs and the other enriched with a safflower/palm oil mixture (high-fat control) as a source of oleic acid. Mammary lipogenic capacity, measured by ^{14}C-glucose incorporation into FAs by mammary explants, was similar among treatments, and there were no treatment effects on the proportion of de novo synthesized FAs in milk fat or

on litter weight gain, a proxy for milk energy secretion. Also, there were no treatment effects on mammary mRNA abundance for key lipogenic enzymes and proteins involved in the regulation of milk lipid synthesis. In contrast, there was a treatment effect on hepatic lipogenesis, with FO resulting in a decrease of ~50% in hepatic lipid content and a similar downregulation of lipogenic gene expression compared with the 2 control diets. Overall, there were tissue-specific differences in dietary VLCn3PUFA effects on lipid synthesis with no observed effects for mammary lipogenic variables but marked reductions occurring in hepatic lipogenesis.

Source: Hussein, M., Harvatine, K.J., Boisclair, Y.R., Bauman, D.E. Department of Animal Science, Cornell University, Ithaca, NY. "Supplementation with Fish Oil as a Source of n-3 Fatty Acids Does Not Downregulate Mammary Lipogenesis in Lactating Mice." The Journal of Nutrition. [Epub ahead of print].

Eating patterns and mental health problems in early adolescence - a cross-sectional study of 12-13-year-old Norwegian schoolchildren

OBJECTIVE: To investigate the association between eating patterns and mental health problems in young Norwegian adolescents (12-13 years of age). DESIGN: Cross-sectional study. Dietary information was reported by parents using a retrospective FFQ. Eating patterns were identified using principal component analysis. The Strengths and Difficulties Questionnaire was used to measure mental health problems. The association between eating patterns and mental health problems was examined using multiple logistic regression analysis. SETTING: Primary schools, Telemark County, Norway. SUBJECTS: Children (n 1095) aged 12-13 years and their parents. RESULTS: Children with high scores on a 'varied Norwegian' eating pattern were less likely to have indications of any psychiatric disorders (adjusted OR = 0·5; 95 % CI 0·3, 1·0) and hyperactivity-inattention disorders (adjusted OR = 0·4; 95 % CI 0·2, 0·8) than children with low scores on this pattern. Children with high scores on a 'junk/convenient' eating pattern were more likely to have indications of hyperactivity-inattention disorders (adjusted OR = 3·4; 95 % CI 1·3, 8·6) than children with low scores on this pattern. Children with high scores on a 'snacking' eating pattern were more likely to have indications of conduct/oppositional disorders (adjusted OR = 3·8; 95 % CI 1·2, 11·5) than those with low scores on this eating pattern. CONCLUSIONS: We identified a significant association between eating patterns and mental health problems in young adolescents, independently of physical activity, sedentary activity and background variables. A diverse diet rich in unrefined plant foods, fish and regular meals was associated with better mental health, while energy-dense, nutrient-poor diets and irregular meals were associated with poorer mental health.

Source: Oellingrath, I.M., Svendsen, M.V., Hestetun, I. Department of Health Studies, Telemark University College, Norway. "Eating patterns and mental health problems in early adolescence - a cross-sectional study of 12-13-year-old Norwegian schoolchildren." Public Health Nutrition 2013 Oct 10:1-9.

Fish oil supplementation ameliorates fructose-induced hypertriglyceridemia and insulin resistance in adult male rhesus macaques

Fish oil (FO) is a commonly used supplemental source of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), 2 n-3 (ω-3) polyunsaturated fatty acids (PUFAs) that have been shown to have a variety of health benefits considered to be protective against cardiometabolic diseases. Although the effects of EPA and DHA on lipid metabolism have been extensively studied, not all of the metabolic effects of FO-derived n-3 PUFAs have been characterized. Our laboratory recently showed that a high-fructose diet in rhesus monkeys induces the features of metabolic syndrome (MetS) similar to those observed in humans. Thus, we specifically wanted to evaluate the effects of FO in rhesus monkeys fed a high-fructose diet and hypothesized that FO supplementation would mitigate their development of fructose-induced insulin resistance, dyslipidemia, and other cardiometabolic risk factors. In this study, adult monkeys (aged 12-20 y) received either standard chow plus 75 g fructose/d (control group; n = 9) or standard chow, 75 g fructose/d, and 4 g FO (16% EPA/11% DHA)/d (treatment group; n = 10) for 6 mo. Importantly, our results showed that daily FO supplementation in the monkeys prevents fructose-induced hypertriglyceridemia and insulin resistance as assessed by intravenous-glucose-tolerance testing ($P \leq 0.05$). Moreover, FO administration in the monkeys prevented fructose-induced increases in plasma apolipoprotein (apo) C3, apo E, and leptin concentrations and attenuated decreases in circulating adropin concentrations ($P \leq 0.05$). No differences between the control and FO-treated monkeys were observed

in body weight, lean mass, fat mass, or fasting glucose, insulin, and adiponectin concentrations. In conclusion, FO administration in a nonhuman primate model of diet-induced MetS ameliorates many of the adverse changes in lipid and glucose metabolism induced by chronic fructose consumption.

Source: Bremer AA, Stanhope KL, Graham JL, Cummings BP, Ampah SB, Saville BR, Havel PJ. "Fish Oil Supplementation Ameliorates Fructose-Induced Hypertriglyceridemia and Insulin Resistance in Adult Male Rhesus Macaques." The Journal of Nutrition. [Epub ahead of print].

A cross sectional study to examine the association between dietary patterns and cognitive impairment in older Chinese people in Hong Kong

Background: Dietary patterns can be identified using a priori and a posterior approaches. Few studies have related dietary patterns with cognitive impairment in Chinese population. This study examined the risk of cognitive impairment associated with dietary patterns identified by both approaches. Methods: Baseline data on 1,926 Chinese men and 1,744 Chinese women aged > 65 years participating in a cohort study examining the risk factors for osteoporosis in Hong Kong were analyzed. Dietary data were collected using a validated food frequency questionnaire. Adherence to a priori dietary patterns, namely the Mediterranean Diet Score (MDS) was assessed. Factor analysis (FA) identified three a posterior dietary patterns: "vegetables-fruits" pattern which was rich in vegetables, fruits, soy products and legumes, "snacks-drinks-milk products" pattern which was a mixture of healthy and unhealthy food groups including fast food, sweets and desserts, nuts, milk products and whole grains, and "meat-fish" pattern which included frequent intake of meat, fish and seafood. Cognitive function was assessed by the Community Screening Instrument for Dementia (CSI-D). Multivariate logistic regression examined the risk of cognitive impairment with adjustment for potential confounders. Results: A total of 221 men and 656 women was classified as cognitive impaired. Neither the MDS nor the dietary patterns identified by FA were associated with risk of cognitive impairment in men. In women, higher "vegetables-fruits" pattern score was associated with reduced risk of cognitive impairment [Adjusted OR=0.73 (95% CI: 0.54-1.00) of the highest quartile of "vegetables-fruits" pattern score compared with the lowest quartile, ptrend=0.018]. Similar inverse trend was observed for "snacks-drinks-milk products" pattern score [Adjusted OR=0.65 (95% CI: 0.47-0.90) of the highest quartile of "snacks-drinks-milk products" pattern score compared with the lowest quartile, ptrend=0.003]. There was no association of "meat-fish" pattern or the MDS with risk of cognitive impairment in women. Conclusion: Higher "vegetables-fruits" and "snacks-drinks-milk products" pattern scores were associated with reduced risk of cognitive impairment in Chinese older women in Hong Kong.

Source: Chan, R., Chan, D., Woo, J. Prince of Wales Hospital, Shatin, Hong Kong. "A Cross Sectional Study to Examine the Association between Dietary Patterns and Cognitive Impairment in Older Chinese People in Hong Kong." The Journal of Nutrition, Health, & Aging 17 (9):757-65.

A fish protein hydrolysate alters fatty acid composition in liver and adipose tissue and increases plasma carnitine levels in a mouse model of chronic inflammation

BACKGROUND: There is growing evidence that fish protein hydrolysate (FPH) diets affect mitochondrial fatty acid metabolism in animals. The aim of the study was to determine if FPH could influence fatty acid metabolism and inflammation in transgene mice expressing human tumor necrosis alpha (hTNFalpha). METHODS: hTNFalpha mice (C57BL/6 hTNFalpha) were given a high-fat (23%, w/w) diet containing 20% casein (control group) or 15% FPH and 5% casein (FPH group) for two weeks. After an overnight fast, blood, adipose tissue, and liver samples were collected. Gene expression and enzyme activity was analysed in liver, fatty acid composition was analyzed in liver and ovarian white adipose tissue, and inflammatory parameters, carnitine, and acylcarnitines were analyzed in plasma. RESULTS: The n-3/n-6 fatty acid ratio was higher in mice fed the FPH diet than in mice fed the control diet in both adipose tissue and liver, and the FPH diet affected the gene expression of [increment]6 and [increment]9 desaturases. Mice fed this diet also demonstrated lower hepatic activity of fatty acid synthase. Concomitantly, a lower plasma INF-gamma level was observed. Plasma carnitine and the carnitine precursor gamma-butyrobetaine was higher in the FPH-group compared to control, as was plasma short-chained and medium-chained acylcarnitine esters. The higher level of plasma acetylcarnitine may reflect a stimulated mitochondrial and perox-

isomal beta-oxidation of fatty acids, as the hepatic activities of peroxisomal acyl-CoA oxidase 1 and mitochondrial carnitine palmitoyltransferase-II were higher in the FPH-fed mice. CONCLUSIONS: The FPH diet was shown to influence hepatic fatty acid metabolism and fatty acid composition. This indicates that effects on fatty acid metabolism are important for the bioactivity of protein hydrolysates of marine origin.

Source: Bjørndal, B., Berge, C., Ramsvik, M.S., Svardal, A., Bohov, P., Skorve, J., Berge, R.K. "A fish protein hydrolysate alters fatty acid composition in liver and adipose tissue and increases plasma carnitine levels in a mouse model of chronic inflammation." Lipids in Health and Disease 12(1):143.

Dietary predictors of maternal prenatal blood mercury levels in the ALSPAC birth cohort study

Background: Very high levels of prenatal maternal mercury have adverse effects on the developing fetal brain. It has been suggested that all possible sources of mercury should be avoided. However, although seafood is a known source of mercury, little is known about other dietary components that contribute to the overall levels of blood mercury. Objective: Our goal was to quantify the contribution of components of maternal diet to prenatal blood mercury level. Methods: Whole blood samples and information on diet and sociodemographic factors were collected from pregnant women (n = 4,484) enrolled in the Avon Longitudinal Study of Parents and Children (ALSPAC). The blood samples were assayed for total mercury using inductively coupled plasma dynamic reaction cell mass spectrometry. Linear regression was used to estimate the relative contributions of 103 dietary variables and 6 sociodemographic characteristics to whole blood total mercury levels (TBM; untransformed and log-transformed) based on R2 values. Results: We estimated that maternal diet accounted for 19.8% of the total variation in ln-TBM, with 44% of diet-associated variability (8.75% of the total variation) associated with seafood consumption (white fish, oily fish, and shellfish). Other dietary components positively associated with TBM included wine and herbal teas, and components with significant negative associations included white bread, meat pies or pasties, and french fries. Conclusions: Although seafood is a source of dietary mercury, seafood appeared to explain a relatively small proportion of the variation in TBM in our UK study population. Our findings require confirmation, but suggest that limiting seafood intake during pregnancy may have a limited impact on prenatal blood mercury levels.

Source: Golding, J., Steer, C.D., Hibbeln, J.R., Emmett, P.M., Lowery, T., Jones, R. Centre for Child and Adolescent Health, University of Bristol, Bristol, United Kingdom. "Dietary Predictors of Maternal Prenatal Blood Mercury Levels in the ALSPAC Birth Cohort Study." Environmental Health Perspectives 121(10):1214-8.

Marine n-3 fatty acids in adipose tissue and development of atrial fibrillation: a Danish cohort study

OBJECTIVE: Consumption of fish and marine n-3 polyunsaturated fatty acids (PUFA) may be associated with a lower risk of atrial fibrillation (AF), but results have been inconsistent. The aim was to investigate this further by measurements of marine n-3 PUFA in adipose tissue. DESIGN: Cohort study. SETTING: A total of 57 053 Danish participants 50-64 years of age were enrolled into the Diet, Cancer and Health Cohort Study. PATIENTS: A randomly drawn subcohort of 3440 participants with available data from baseline adipose tissue biopsies. INTERVENTIONS: Exposure was the adipose tissue content of marine n-3 PUFA, which reflects the endogenous exposure and is also an objective marker of the long-term dietary intake. MAIN OUTCOME MEASURES: Incident AF during follow-up. RESULTS: 179 cases of AF occurred over 13.6 years. Multivariate, sex-stratified Cox proportional hazards regression analyses using cubic splines showed a monotonic, negative, dose-response trend, but not statistically significant association, between total marine n-3 PUFA in adipose tissue and incident AF. A similar trend towards a lower risk of AF was seen in the second (HR 0.87, 95% CI 0.60 to 1.24) and third tertiles (HR 0.77, 95% CI 0.53 to 1.10) of marine n-3 PUFA compared with the lowest tertile. Similar trends, but also not statistically significant, were found separately for eicosapentaenoic, docosahexaenoic and docosapentaenoic acids. CONCLUSIONS: There was no statistically significant association between the content of marine n-3 PUFA in adipose tissue and the development of AF; however, data showed a monotonic, negative dose-response trend suggestive of a negative association.

Source: Rix, T.A., Joensen, A.M., Riahi, S., Lundbye-Christensen, S., Overvad, K., Schmidt, E.B. Aalborg University Hospital, Aalborg, Denmark. "Marine n-3 fatty acids in adipose tissue and development of atrial fibrillation: a Danish cohort study." Heart (British Cardiac Society) 99(20):1519-24.

Prenatal mercury exposure and infant birth weight in the Norwegian Mother and Child Cohort Study

OBJECTIVE: To examine the association between calculated maternal dietary exposure to Hg in pregnancy and infant birth weight in the Norwegian Mother and Child Cohort Study (MoBa). DESIGN: Exposure was calculated with use of a constructed database of Hg in food items and reported dietary intake during pregnancy. Multivariable regression models were used to explore the association between maternal Hg exposure and infant birth weight, and to model associations with small-for-gestational-age offspring. SETTING: The study is based on data from MoBa. SUBJECTS: The study sample consisted of 62 941 women who answered a validated FFQ which covered the habitual diet during the first five months of pregnancy. RESULTS: Median exposure to Hg was 0·15 μg/kg body weight per week and the contribution from seafood intake was 88 % of total Hg exposure. Women in the highest quintile compared with the lowest quintile of Hg exposure delivered offspring with 34 g lower birth weight (95 % CI -46 g, -22 g) and had an increased risk of giving birth to small-for-gestational-age offspring, adjusted OR = 1·19 (95 % CI 1·08, 1·30). Although seafood intake was positively associated with increased birth weight, stratified analyses showed negative associations between Hg exposure and birth weight within strata of seafood intake. CONCLUSIONS: Although seafood intake in pregnancy is positively associated with birth weight, Hg exposure is negatively associated with birth weight. Seafood consumption during pregnancy should not be avoided, but clarification is needed to identify at what level of Hg exposure this risk might exceed the benefits of seafood.

Source: Vejrup, K., Brantsæter, A.L., Knutsen, H.K., Magnus, P., Alexander, J., Kvalem, H.E., Meltzer, H.M., Haugen, M. Division of Epidemiology, Norwegian Institute of Public Health, Oslo, Norway. "Prenatal mercury exposure and infant birth weight in the Norwegian Mother and Child Cohort Study." Public Health Nutrition 2013 Oct 8:1-10.

Lead, mercury and cadmium in umbilical cord blood and its association with parental epidemiological variables and birth factors

BACKGROUND: In Spain, few studies have evaluated prenatal exposure to heavy metals. The objective of this study was to describe lead, mercury and cadmium concentrations in blood from a sample of newborn--mother-father trios, as well as to investigate the association between metals in cord blood and parental variables. We also explored the relationship between cord blood metal concentrations and child characteristics at birth. METHODS: Metal correlations among family members were assessed using Spearman Rank Correlation Coefficient. Linear regression was used to explore the association between parental variables and log-transformed cord blood lead and cord blood mercury concentrations. In the case of cadmium, tobit regression was used due to the existence of samples below the detection limit. The association between cord blood metal concentrations and child characteristics at birth was evaluated using linear regression. RESULTS: Geometric means for lead, mercury and cadmium were 14.09 mug/L, 6.72 mug/L and 0.27 mug/L in newborns; 19.80 mug/L, 3.90 mug/L and 0.53 mug/L in pregnant women; and 33.00 mug/L, 5.38 mug/L and 0.49 mug/L in men. Positive correlations were found between metal concentrations among members of the trio. Lead and cadmium concentrations were 15% and 22% higher in newborns from mothers who smoked during pregnancy, while mercury concentrations were 25% higher in newborns from mothers with greater fish intake. Cord-blood lead levels showed seasonal periodicity, with lower concentrations observed in winter. Cord blood cadmium concentrations over 0.29 mug/L were associated with lower 1-minute and 5-minute Apgar scores. CONCLUSIONS: These results reinforce the need to establish biomonitoring programs in Spain, and provide support for tobacco smoke and fish consumption as important preventable sources of heavy metal exposure in newborns. Additionally, our findings support the hypothesis that cadmium exposure might be deleterious to fetal development.

Source: García-Esquinas, E., Pérez-Gómez, B., Fernández-Navarro, P., Fernández, M.A., de Paz, C., Pérez-Meixeira, A.M., Gil, E., Iriso, A., Sanz, J.C., Astray, J., Cisneros, M., de Santos, A., Asensio, A., García-Sagredo, J.M., García, J.F., Vioque, J., López-Abente, G., Pollán, M., González, M.J., Martínez, M., Aragonés, N. "Lead, mercury and cadmium in umbilical cord blood and its association with parental epidemiological variables and birth factors." BMC Public Health 13(1):841.

Associations of prenatal mercury exposure from maternal fish consumption and polyunsaturated fatty acids with child neurodevelopment: a prospective cohort study in Italy

BACKGROUND: Mercury is a neurotoxin, and limited prenatal exposure to it can affect long-term child neurodevelopment. However, results of epidemiologic studies of such exposure have been inconsistent. We examined the association of prenatal mercury exposure from maternal fish consumption with child neurodevelopment in northern Italy. METHODS: A population-based cohort of 606 children and their mothers was studied from pregnancy to age 18 months. Mercury levels were measured in maternal hair and blood during pregnancy and in umbilical cord blood and breast milk. Levels of polyunsaturated fatty acids (PUFAs) were measured in maternal serum. Maternal and child intakes of fish were assessed by using a food frequency questionnaire. The Bayley Scales of Infant and Toddler Development, Third Edition (BSID-III) was used to evaluate child neurodevelopment. Multivariate linear regression was used to examine the association of mercury exposure with BSID-III scores, after controlling for maternal fish intake, PUFAs during pregnancy, and several other confounders. RESULTS: Mean weekly fish intake during pregnancy was less than 2 servings. Mercury concentrations in biological samples were low (mean, 1061 ng/g in hair) and moderately correlated with fish intake, particularly of carnivorous species. Maternal ω-3 PUFA concentrations were poorly correlated with fish intake. Maternal intelligence quotient (IQ) and child intake of fish were significantly associated with neurodevelopment scores. In multivariate models, the level of Hg exposure was not associated with neurodevelopmental performance at 18 months. CONCLUSIONS: In this Italian population, neurodevelopment at 18 months was associated with child intake of fresh fish and maternal IQ rather than with mercury exposure. The expected beneficial effect of maternal fish intake (from maternal ω-3 PUFAs) was not found.

Source: Valent, F., Mariuz, M., Bin, M., Little, D., Mazej, D., Tognin, V., Tratnik, J., McAfee, A.J., Mulhern, M.S., Parpinel, M., Carrozzi, M., Horvat, M., Tamburlini, G., Barbone, F. Institute of Hygiene and Clinical Epidemiology, University Hospital of Udine, Udine, Italy. "Associations of prenatal mercury exposure from maternal fish consumption and polyunsaturated fatty acids with child neurodevelopment: a prospective cohort study in Italy." Journal of Epidemiology / Japan Epidemiological Association 23(5):360-70.

Determination of mercury in some freshwater fish species from Chahrmahal va Bakhtyari Province, Iran and potential limits for human consumption

Concentrations of mercury in four freshwater fish species from Gandoman and Sooleghan Lagoons and Beheshtabad River were determined by Cold Vapor Atomic Absorption Spectrometry. Concentrations of mercury in muscle of 90 fish ranged from 21 to 31 μg kg^{-1} (mean = 26 μg kg^{-1}). Statistical analysis showed no statistical relationship between mean mercury concentration and fish species, although concentration of mercury in different seasons and habitats was statistically different ($p < 0.05$). The results indicated that fish from Gandoman and Sooleghan Lagoons and Beheshtabad River have concentrations well below the maximum permissible levels of mercury according to international standards with no health risk for consumers.

Source: Raissy, M. Department of Aquatic Animal Health, Islamic Azad University, Shahrekord, Iran. "Determination of Mercury in Some Freshwater Fish Species from Chahrmahal va Bakhtyari Province, Iran and Potential Limits for Human Consumption." Bulletin of Environmental Contamination and Toxicology. [Epub ahead of print].

Influence of fishing technique on organochlorine pesticide accumulation in fish and its possible human health risk in the Republic of Bénin

In Bénin different techniques are used for large-scale commercial fishing, Acadjas (enclosures constructed in the river) and Whédos (holes made in the river banks). This study aimed at assessing the extent of contamination related to these fishing techniques. Fish contained residues of DDT and its metabolites, α-endosulfan, dieldrin, aldrin, endrin and lindane. Pesticide levels were similar in fish from Acadjas and Whédos, except for higher α-endosulfan levels in fish from the Whédos. Comparing pesticide intake levels through fish consumption with tolerable daily intake levels showed that in all cases risk for human health is low.

Source: Yehouenou, A., Pazou, E., Azehoun, J.P., Ahoyo, T., Aléodjrodo, P.E., van Straalen, N.M., van Gestel, C.A. Laboratoire de Recherche en Biologie Appliquée (LARBA), Université d'Abomey-Calavi, Cotonou, Benin. "Influence of fishing technique on organochlorine pesticide accumulation in fish and its possible human healthrisk in the Republic of Bénin." Bulletin of Environmental Contamination and Toxicology 91(3):278-82.

Health risk assessment of mercury and arsenic associated with consumption of fish from the Persian Gulf

Concentrations of mercury and arsenic in fish from the Persian Gulf were determined by graphite furnace atomic absorption spectrometry. Concentrations of the metals in muscle samples were 0.049-0.402 μg g^{-1} for mercury and 0.168-0.479 μg g^{-1} for arsenic, with means of 0.133 and 0.312 μg g^{-1}, respectively. The maximum daily consumption rate (grams per day) and meal consumption limit (meals per month) was calculated to estimate health risks associated with fish consumption. According to the results, the maximum allowable consumption rate varies between 8-56 and 15-96 g/day base on mercury and arsenic content, respectively. The results of this study indicate that the concentration of mercury and arsenic is well below the maximum permissible levels for mercury (0.5 μg g^{-1}) and arsenic (6 μg g^{-1}) according to international standards.

Source: Raissy M, Ansari M. Department of Aquatic Animal Health, Islamic Azad University, Shahrekord, Iran. "Health risk assessment of mercury and arsenic associated with consumption of fish from the Persian Gulf." Environmental Monitoring and Assessment. [Epub ahead of print].

Can fish consumption advisories do better? Providing benefit and risk information to increase knowledge

Source: Engelberth, H., Teisl, M.F., Frohmberg, E., Butts, K., Bell, K.P., Stableford, S., Smith, A.E. University of Maine, Orono, ME. "Can fish consumption advisories do better? Providing benefit and risk information to increase knowledge." Environmental Research126:232-9.

PBDEs, PCBs and organochlorine pesticides distribution in edible fish from Negro River basin, Argentinean Patagonia

Source: Ondarza, P.M., Gonzalez, M., Fillmann, G., Miglioranza, K.S. "PBDEs, PCBs and organochlorine pesticides distribution in edible fish from Negro River basin, Argentinean Patagonia." Chemosphere. S0045-6535(13)01334-9.

Longitudinal and secular trends in dietary supplement use: Nurses' Health Study and Health Professionals Follow-Up Study, 1986-2006

Source: Kim, H.J., Giovannucci, E., Rosner, B., Willett, W.C., Cho, E. "Longitudinal and Secular Trends in Dietary Supplement Use: Nurses' Health Study and Health Professionals Follow-Up Study, 1986-2006." Journal of the Academy of Nutrition and Dietetics 2013 Oct 9. S2212-2672(13)01253-7.

Probabilistic risk assessment of exposure to leucomalachite green residues from fish products

Source: Chu, Y.L., Chimeddulam, D., Sheen, L.Y., Wu, K.Y. Institute of Food Science and Technology, National Taiwan University, Taipei, Taiwan. "Probabilistic risk assessment of exposure to leucomalachite green residues from fish products." Food and Chemical Toxicology S0278-6915(13)00677-7.

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, Shanghai University, Shanghai, China. "Organochlorine pesticides in fish from Taihu Lake, China, and associated human health risk assessment." Ecotoxicology and Environmental Safety pii: S0147-6513(13)00310-2.

Contribution of dietary patterns to blood heavy metal concentrations in Korean adults: Findings from the Fifth Korea National Health and Nutrition Examination Survey 2010

Source: Chung, H.K., Park, J.Y., Cho, Y., Shin, M.J. Severance Institute for Vascular and Metabolic Research, College of Medicine, Yonsei University, Seoul, Republic of Korea. "Contribution of dietary patterns to blood heavy metal concentrations in Korean adults: Findings from the Fifth Korea National Health and Nutrition Examination Survey 2010." Food and Chemical Toxicology pii: S0278-6915(13)00672-8.

Dietary fish oil reduces the acute inflammatory response and enhances resolution of antigen-induced peritonitis

Source: Tomasdottir, V., Vikingsson, A., Freysdottir, J., Hardardottir, I. Department of Biochemistry and Molecular Biology, University of Iceland; Center of Rheumatology Research and Department of Immunology, The University Hospital of Iceland, Reykjavik, Iceland. "Dietary fish oil reduces the acute inflammatory response and enhances resolution of antigen-induced peritonitis." The Journal of Nutritional Biochemistry 24(10):1758-65.

Dietary intake of PBDEs of residents at two major electronic waste recycling sites in China

Source: Chan, J.K., Man, Y.B., Wu, S.C., Wong, M.H. Croucher Institute for Environmental Sciences, Hong Kong Baptist University, Kowloon Tong, Hong Kong, China; School of Biological Sciences, The University of Hong Kong, Pokfulam, Hong Kong, China. "Dietary intake of PBDEs of residents at two major electronic waste recycling sites in China." The Science of the Total Environment 463-464:1138-46.

Essential and toxic element concentrations in blood and urine and their associations with diet: results from a Norwegian population study including high-consumers of seafood and game

Source: Birgisdottir, B.E., Knutsen, H.K., Haugen, M., Gjelstad, I.M., Jenssen, M.T., Ellingsen, D.G., Thomassen, Y., Alexander, J., Meltzer, H.M., Brantsæter, A.L. "Essential and toxic element concentrations in blood and urine and their associations with diet: results from a Norwegian population study including high-consumers of seafood and game." Division of Environmental Medicine, Norwegian Institute of Public Health, Oslo, Norway. The Science of the Total Environment 463-464:836-44.

Histamine levels in commercially important fresh and processed fish of Oman with reference to international standards

Source: Yesudhason, P., Al-Zidjali, M., Al-Zidjali, A., Al-Busaidi, M., Al-Waili, A., Al-Mazrooei, N., Al-Habsi, S. Fishery Quality Control Center, Ministry of Agriculture and Fisheries Wealth, Oman. "Histamine levels in commercially important fresh and processed fish of Oman with reference to international standards." Food Chemistry140(4):777-83.

A baseline study on levels of polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans, non-ortho and mono-ortho PCBs, non-dioxin-like PCBs and polybrominated diphenyl ethers in Northeast Arctic cod (Gadus morhua) from different parts of the Barents Sea

Source: Julshamn, K., Duinker, A., Berntssen, M., Nilsen, B.M., Frantzen, S., Nedreaas, K., Maage, A. National Institute of Nutrition and Seafood Research, Bergen, Norway. "A baseline study on levels of polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans, non-ortho and mono-ortho PCBs, non-dioxin-like PCBs and polybrominated diphenyl ethers in Northeast Arctic cod (Gadus morhua) from different parts of the Barents Sea." Marine Pollution Bulletin 75(1-2):250-8.

Monola oil versus canola oil as a fish oil replacer in rainbow trout feeds: effects on growth, fatty acid metabolism and final eating quality

Source: Turchini, G.M., Moretti, V.M., Hermon, K., Caprino, F., Busetto, M.L., Bellagamba, F., Rankin, T., Keast, R.S., Francis, D.S. School of Life and Environmental Sciences, Deakin University, Warrnambool, Victoria, Australia. "Monola oil versus canola oil as a fish oil replacer in rainbow trout feeds: effects on growth, fatty acid metabolism and final eating quality." Food Chemistry 141(2):1335-44.

A maternal diet of fatty fish reduces body fat of offspring compared with a maternal diet of beef and a post-weaning diet of fish improves insulin sensitivity and lipid profile in adult C57BL/6 male mice

Source: Hussain, A., Nookaew, I., Khoomrung, S., Andersson, L., Larsson, I., Hulthén, L., Jansson, N., Jakubowicz, R., Nilsson, S., Sandberg, A.S., Nielsen, J., Holmäng, A. Department of Physiology, Institute of Neuroscience and Physiology, The Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden. "A maternal diet of fatty fish reduces body fat of offspring compared with a maternal diet of beef and a post-weaning diet of fish improves insulin sensitivity and lipid profile in adult C57BL/6 male mice." Acta Physiologica (Oxf) 209(3):220-34.

Maternal fat intake during pregnancy and wheeze and eczema in Japanese infants: the Kyushu Okinawa Maternal and Child Health Study

Source: Miyake, Y., Tanaka, K., Okubo, H., Sasaki, S., Arakawa, M. Department of Preventive Medicine and Public Health, Faculty of Medicine, Fukuoka University, Fukuoka, Japan. "Maternal fat intake during pregnancy and wheeze and eczema in Japanese infants: the Kyushu Okinawa Maternal and Child Health Study." Annals of Epidemiology 23(11):674-80.

Influence of socio-demographic and diet determinants on the levels of mercury in preschool children from a Mediterranean island

Source: Garí, M., Grimalt, J.O., Torrent, M., Sunyer, J. Department of Environmental Chemistry, Institute of Environmental Assessment and Water Research (IDAEA-CSIC), Barcelona, Spain. "Influence of socio-demographic and diet determinants on the levels of mercury in pre-school children from a Mediterranean island." Environmental Pollution 182:291-8.

Cytotoxicity evaluation and antioxidant enzyme expression related to heavy metals found in tuna by-products meal: An in vitro study in human and rat liver cell lines

Source: Saïdi, S.A., Azaza, M.S., Windmolders, P., van Pelt, J., El-Feki, A. Laboratory of Animal Ecophysiology, Sciences Faculty of Sfax, Department of Life Sciences, Sfax, Tunisia; Liver Research Facility/Labo Hepatology, University Hospital Gasthuisberg, Leuven, Belgium. "Cytotoxicity evaluation and antioxidant enzyme expression related to heavy metals found in tuna by-products meal: An in vitro study in human and rat liver cell lines." Experimental and Toxicologic Pathology 65(7-8):1025-33.

Dietary flaxseed oil and fish oil modulates expression of antioxidant and inflammatory genes with alleviation of protein glycation status and inflammation in liver of streptozotocin-nicotinamide induced diabetic rats

Source: Jangale, N.M., Devarshi, P.P., Dubal, A.A., Ghule, A.E., Koppikar, S.J., Bodhankar, S.L., Chougale, A.D., Kulkarni, M.J., Harsulkar, A.M. Department of Pharmaceutical Biotechnology, Bharati Vidyapeeth Deemed University, Poona College of Pharmacy, India. "Dietary flaxseed oil and fish oil modulates expression of antioxidant and inflammatory genes with alleviation of protein glycation status and inflammation in liver of streptozotocin-nicotinamide induced diabetic rats." Food Chemistry 141(1):187-95.

A review of human exposure to polybrominated diphenyl ethers (PBDEs) in China

Source: Ni, K., Lu, Y., Wang, T., Kannan, K., Gosens, J., Xu, L., Li, Q., Wang, L., Liu, S. State Key Laboratory of Urban and Regional Ecology, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing, China; Graduate University of Chinese Academy of Sciences, Beijing, China. "A review of human exposure to polybrominated diphenyl ethers (PBDEs) in China." International Journal of Hygiene and Environmental Health 216(6):607-23.

Plasma mercury levels in Hong Kong residents: in relation to fish consumption

Source: Liang, P., Qin, Y.Y., Zhang, C., Zhang, J., Cao, Y., Wu, S.C., Wong, C.K., Wong, M.H. School of Environment and Resources Science, Zhejiang Agriculture and Forest University, Lin'an, PR China. "Plasma mercury levels in Hong Kong residents: in relation to fish consumption." The Science of the Total Environment 463-464:1225-9.

Serum adiponectin concentration in relation to macronutrient and food intake in young Japanese women

Source: Murakami, K., Sasaki, S., Uenishi, K. Japan Dietetic Students' Study for Nutrition and Biomarkers Group. Northern Ireland Centre for Food and Health (NICHE), University of Ulster, United Kingdom; JSPS Postdoctoral Fellow for Research Abroad, Japan Society for the Promotion of Science, Tokyo, Japan; Department of Social and Preventive Epidemiology, School of Public Health, University of Tokyo, Japan. "Serum adiponectin concentration in relation to macronutrient and food intake in young Japanese women." Nutrition 29(11-12):1315-20.

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

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