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Prenatal Nutrition Guidelines for Health Professionals

Fish and Omega-3 Fatty Acids

Canada 

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Prenatal Nutrition Guidelines for Health Professionals

Fish and omega-3 fatty acids

Canada's Food Guide recommends that Canadians consume at least 150 grams (5 ounces) of cooked fish each week as part of a healthy pattern of eating. Experts around the world agree with this recommendation (WHO/FAO, 2003; US 2005 Dietary Advisory Committee, 2005; UK Scientific Advisory Committee on Nutrition, 2005; European Food Safety Authority, 2005). Yet, many women may avoid eating fish altogether because of concerns about the safety of fish intake during the pregnancy.

Some types of fish contain environmental contaminants like methyl mercury (Forsyth et al, 2004). However, in general, the majority of fish sold in Canada have levels of mercury far below the maximum limit¹ set by Health Canada (Dabeka et al, 2004). Health professionals play an important role in encouraging women of childbearing age to eat fish regularly and in informing them about the types of fish to choose most often to limit exposure to environmental contaminants.

KEY MESSAGES ON FISH FOR WOMEN OF CHILDBEARING AGE

- Have at least 150 grams (5 ounces) of cooked fish each week, as recommended in Canada's Food Guide.* Fish contains omega-3 fats and other important nutrients for a healthy pregnancy.
- * Vary the types of fish you eat and follow advice from Health Canada to limit your exposure to environmental contaminants such as mercury. The recommended intake for some predatory fish is less than 150 grams (5 ounces) per month. Refer to Health Canada's website: www.healthcanada.gc.ca/mercuryandfish
- * Consult local, provincial or territorial governments for information about eating locally caught fish. Environment Canada's website provides useful links: www.ec.gc.ca/mercury

FISH CONTRIBUTES TO A HEALTHY PREGNANCY

Experts agree that fish can contribute to a healthy diet during pregnancy (UK Scientific Advisory Committee on Nutrition, 2005; European Food Safety Authority, 2005; IOM, 2007; Kris-Etherton et al, 2007). The benefits of eating fish are greater than not eating fish, when pregnant women² choose the recommended types and amounts (IOM, 2007). Women who eat fish while pregnant give their growing fetus important nutrients. Fish is a unique choice among the Meat and Alternatives food group because of its fat profile;

(1) The maximum limit set by Health Canada is 0.5 ppm in edible portion of all retail fish, with six exceptions: 1 ppm total mercury for the edible portion of escolar, orange roughy, marlin, fresh and frozen tuna, shark, and swordfish (Health Canada, 2007).

(2) Pregnant women should thoroughly cook fish and seafood, including refrigerated smoked products. Eating raw or partially cooked fish and seafood increases the risk of contracting a food-borne illness such as listeriosis.

compared to other choices, fish is generally lower in saturated fats and higher in the long chain polyunsaturated omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Fish also contains high quality protein and other essential nutrients: vitamins (such as vitamin D and choline) and minerals (such as selenium, iodine, iron, zinc and copper). (See table 1.)

Several observational studies have shown a positive association between higher intakes of fish than is typically consumed by North American women and small increases in gestational length (Olsen et al, 2006; Guldner et al, 2007; IOM, 2007; Haugen et al, 2008) as well as an association between higher intakes of fish and higher indices of child neurodevelopment (Hibbeln et al, 2007; IOM, 2007; Oken et al, 2008). Higher intakes of fish, however, can increase a woman's exposure to contaminants. The types and amounts of contaminants differ among the types of fish and other seafood consumed; exposure to some contaminants may have negative effects on infant outcome (Oken et al, 2005; Guldner et al 2007; Halldorsson et al, 2007). Women should therefore be advised to eat fish during pregnancy and to choose those fish known to have lower levels of contaminants (see next sections).

TABLE 1: NUTRIENTS IN FISH AND OTHER MEAT AND ALTERNATIVES

Food	Content per 75 g (cooked)										
	Total fat (g)	ALA (mg)	DHA (mg)	EPA(mg)	Saturated Fat (g)	Iron ^a (mg)	Magnesium (mg)	Potassium (mg)	Zinc (mg)	Selenium (mcg)	Vitamin D (mcg)
Salmon, Atlantic, farmed	9.26	85	1093	518	1.88	0.26	22	288	0.32	31	5.10
Sockeye salmon, canned	7.58	65	835	554	1.75	0.67	21	262	0.58	26.6	14.62
Rainbow trout, farmed	5.40	62	615	250	1.58	0.25	24	331	0.37	11.2	4.79
Jack mackerel, canned	4.72	32	597	326	1.39	1.53	28	146	0.76	28.3	4.72
Coho salmon, wild	3.22	41	494	301	0.79	0.28	23	326	0.42	28.5	12.67
Rainbow trout, wild	4.36	140	390	351	1.21	0.28	23	336	0.38	9.9	5.25
Halibut, Greenland (Turbot)	13.3	41	378	506	2.33	0.64	25	258	0.38	35.1	14.25
Pollock (Boston bluefish)	0.94	n/a	338	68	0.13	0.44	64	342	0.45	35.1	1.42
Arctic char	3.75	75	300	375	0.67	0.38	22	n/a	0.45	n/a	2.79
Omega-3 enriched eggs	9	n/a	150	n/a	2.25	n/a	n/a	n/a	n/a	n/a	n/a
Sole	1.15	12	194	182	0.272	0.26	44	258	0.47	43.6	1.12
Light tuna, canned	0.62	2	167	35	0.18	1.15	20	178	0.58	60.3	0.91
Cod	0.64	1	116	3	0.13	0.37	32	183	0.44	28.2	0.52
Shrimp	0.81	9	108	128	0.217	2.32	26	136	1.17	29.7	0
Tilapia	1.99	34	98	4	0.70	0.52	26	285	0.31	40.8	n/a
Chicken, dark meat	7.30	68	38	8	1.99	1.00	17	180	2.10	13.5	0.07
Eggs	7.42	25	28	3	2.32	1.37	9	100	0.82	31.6	0.86
Chicken, breast	1.54	13	9	4	0.437	0.42	22	301	0.75	23.7	0.64
Pork	2.85	22	0	0	1.19	0.60	23	319	1.65	n/a	0.15

Source: Amounts are approximate, based on Canadian Nutrient File, 2007b, with the exception of omega-3 enriched eggs (Sindelar et al, 2004).

^a Total amount of iron consists of variable proportions of heme and non-heme iron.

Note: Meat from ruminants (cows, lamb, goats) is naturally low in DHA.

RECOMMENDED FISH INTAKE DURING PREGNANCY

Health Canada recommends that women continue eating at least 150 grams (5 ounces) of cooked fish each week during pregnancy, as recommended in Canada's Food Guide. Health Canada also suggests that women pay special attention to the types of fish they eat. Since many pregnancies are unplanned, the advice presented in this document also applies to all women of childbearing age, including breastfeeding women.

Women should choose the types of fish that generally have low levels of contaminants, such as salmon, trout, herring, haddock, canned light tuna, pollock (Boston bluefish), sole, flounder, anchovy, char, hake, mullet, smelt, Atlantic mackerel and lake white fish.

FISH THAT SHOULD BE EATEN LESS OFTEN

Some types of fish contain contaminants such as methyl mercury. Women who eat too much of these types of fish can ingest too many contaminants. Health Canada issues retail fish consumption advisories. Advisories on local fish are available from provincial and territorial agencies. Environment Canada maintains a [listing of authorities](#) that are responsible for implementing fish consumption advice in each province and territory.

Women can limit the exposure to contaminants by choosing fish that generally do not contain levels that pose a health risk.

METHYL MERCURY

Methyl mercury is an organic form of mercury. It is the form of mercury found in fish. Toxicity can occur in humans exposed to methyl mercury. This form of mercury is particularly toxic to the central nervous system, with the developing infant brain being particularly sensitive. Methyl mercury can cross the placenta.

Fish accumulate methyl mercury from the surrounding water. Carnivorous fish also accumulate methyl mercury from the prey that they eat. This means that the amount of mercury in fish increases with the size and age of fish and with the type of food that the fish eats. Generally, predatory fish contain higher levels of methyl mercury. These fish include fresh and frozen tuna, shark, swordfish, marlin, orange roughy and escolar (Forsyth et al, 2004).

To minimize mercury exposure from fish, Health Canada has issued specific advice for women who are or may become pregnant as well as breastfeeding women to limit their intake of tuna (fresh and frozen), shark, swordfish, marlin, orange roughy and escolar to no more than 150 grams (5 ounces) per month³.

Health Canada also advises women who are or may become pregnant as well as breastfeeding women to limit their intake of canned (white) albacore tuna to no more than 300 grams (10 ounces) per week⁴. This advice does not apply to canned light tuna. Canned light tuna contains other species of tuna such as skipjack, yellowfin, and tongol, which are low in mercury. Pregnant women (and all others) do not have to limit the amount they eat of these types of canned tuna.

OTHER CONTAMINANTS

Health Canada monitors the concentrations of various chemicals in foods, including Polychlorinated Biphenyls (PCBs), in its ongoing [Total Diet Study surveys](#). In addition, in 2002, Health Canada undertook a [specific survey](#) on farmed and wild caught fish and seafood products sold at the retail level. Based on these assessments, Health Canada has determined that Canadians are not exposed to PCBs and other contaminants in fish and seafood products sold in Canada at levels that pose a health risk, and that there is

(3) Recommendations for children and for adults in general are available on Health Canada's website: <http://www.healthcanada.gc.ca/mercuryandfish>

(4) Recommendations for children are available on Health Canada's website: <http://www.hc-sc.gc.ca/fn-an/securit/chem-chim/envIRON/mercur/cons-adv-etud-eng.php>

no need for specific consumption advice at this time (Tittlemier et al, 2004; Rawn et al, 2006).

OMEGA-3 FATTY ACIDS IN PREGNANCY

Women need more omega-3 fatty acids in pregnancy (IOM, 2002). Omega-3 fatty acids are transferred across the placenta and play an important role in the growth and development of the infant.

There are different types of omega-3 fatty acids in the diet. The omega-3 fat, alpha-linolenic acid (ALA) is found in some vegetable oils, nuts and seeds. These include canola oil, flax oil, walnut oil, walnuts and flax seeds. Our bodies can convert ALA into other omega-3 fats including docosahexaenoic acid (DHA). DHA and another omega-3 fatty acid, eicosapentaenoic acid (EPA) are found only in animal tissue lipids. The Institute of Medicine has established Dietary Reference Intakes⁵ values for ALA but not for EPA or DHA (IOM, 2002).

The best source of EPA and DHA is fatty fish; although DHA is found in other animal tissue lipids like eggs (see Table 1). DHA is an important omega-3 fatty acid in the brain. During pregnancy, DHA is transferred from the mother across the placenta and accumulates in the growing fetal brain and other tissues. After birth, DHA is transferred through breast milk. Dietary DHA contributes to the mother's DHA status, and pregnant and breastfeeding women with higher intakes of DHA transfer more DHA to their fetus, and supply more DHA in their breast milk (IOM, 2007).

Whether or not current diets provide sufficient ALA, or if ALA can be adequately converted to supply enough DHA during pregnancy and lactation, is uncertain (Plourde and Cunnane, 2007). While higher intakes of fish during pregnancy and breastfeeding have been linked to better infant and child development (see earlier section *Fish contributes to a healthy pregnancy*), there is no evidence that women who follow a healthy diet and eat no fish, such as lacto-ovo vegetarians, are at risk for pregnancy complications or poor child development.

Fish oil supplements and DHA enriched foods can provide important omega-3 fatty acids found in fish. However, there is insufficient evidence to draw any conclusion on the effects of fish oil supplements and DHA enriched foods on infant development (IOM, 2007). Additionally, the benefits of omega-3 fatty acids on complications of pregnancy (such as pre-eclampsia) remain uncertain, while research on omega-3 fatty acids and post-partum depression is incomplete (Makrides et al, 2006; Freeman, 2006; IOM, 2007; Freeman et al, 2008; Rees et al, 2008; Su et al, 2008).

(5) The Dietary Reference Intakes (DRIs) are a comprehensive set of nutrient reference values for healthy populations that can be used for assessing and planning diets. DRIs are established by Canadian and American scientists through a review process overseen by the U.S. National Academies, which is an independent, nongovernmental body.

IMPLICATIONS FOR PRACTICE

GETTING THE BENEFITS OF FISH AND LIMITING EXPOSURE TO CONTAMINANTS

Many women in Canada eat less fish than is recommended in Canada's Food Guide. Health professionals play an important role in providing information on healthy food choices and relaying appropriate messaging about contaminants in food. They can make women aware of the benefits of eating fish, as part of a healthy diet, and provide guidance on the types of fish to choose for limiting exposure to environmental contaminants like methyl mercury.

Points to review when talking with women about the benefits of fish:

- Encourage women to eat at least 150 g (5 ounces) of cooked fish each week as recommended in [Canada's Food Guide](#). Fish contributes to a healthy eating pattern during pregnancy.
- Discuss how fish provides significant amounts of omega-3 fats and other essential nutrients in the diet of pregnant women, such as vitamin D, zinc and iron.
- Discuss how to get the best health benefits from fish by using lower fat cooking methods such as grilling, poaching, broiling or baking.
- Discuss ways to improve a woman's taste for fish. For example, preparing fish with lemon juice, herbs (such as dill) or spices (such as curry) can add pleasing flavours and aroma to fish. Canned fish eaten cold in a salad or sandwich has a mild flavour.
- Advise pregnant women to thoroughly cook fish and seafood, including refrigerated smoked products. Eating raw or partially cooked fish and seafood increases the risk of contracting a food-borne illness such as listeriosis.

Points to review when talking with women about limiting exposure to contaminants:

- Inform women about which fish to eat. Highlight the types of fish that are generally low in contaminants: salmon, trout, herring, haddock, canned light tuna, pollock (Boston bluefish), sole, flounder, anchovy, char, hake, mullet, smelt, Atlantic mackerel and lake white fish.
- Advise women to limit the amount of fresh/frozen tuna, shark, swordfish, escolar, marlin, and orange roughy. They should eat no more than 150 g (5 ounces) per month.
- Let women who eat canned 'albacore' or 'white' tuna know that they should limit the amount they eat. They should eat no more than 300 grams (10 ounces) per week. This is equal to about two 170-g cans of albacore tuna per week. Health Canada has not established a maximum limit on eating light tuna such as 'skipjack', 'yellowfin' and 'tongol'; these types of tuna are low in mercury. The type of tuna found in canned varieties is indicated on the front of the label.

- Let women know about the potential risk of chemical contamination from eating local fish. Check with your local, provincial or territorial government⁶ for any advisory in your area.
- Provide women with written materials that offer guidance on the types of fish to limit during the childbearing years. Contact your local public health unit⁷ to find resources adapted to your region.

Points to review when talking to women who take fish oil supplements:

- Emphasize a food-based approach to women who do not eat fish. Chickens are quite efficient at converting ALA to DHA and therefore omega-3 eggs can contribute significant amounts of DHA to the diet. (See Table 1) Fish oil supplements should not be considered equivalent to eating fish⁸.
- Advise women who wish to take a fish oil supplement to look for a Natural Product Number (NPN) on the product label. This shows that the fish oil supplement is government-approved for safety, efficacy, and quality. They should avoid taking cod liver oil, particularly if they are already taking a multivitamin supplement. Women may unintentionally have intakes of vitamin A above the Tolerable Upper Intake Level (UL) of 3,000 mcg retinol activity equivalent (RAE) or 10,000 IU, since both liver oil capsules and multivitamin⁹ supplements contain vitamin A.

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(6) Environment Canada maintains a [listing of authorities](#) that are responsible for implementing fish consumption advice in each province and territory.

(7) Health Canada maintains a [listing of provincial and territorial health ministries](#).

(8) Although fish oil supplements are associated with cardiovascular health benefits, fish is still the preferred choice during pregnancy because it contributes nutrients other than omega-3 fatty acids to the healthy eating pattern.

(9) According to Health Canada's Multi-vitamin/mineral supplement monograph, the vitamin A content per daily dose must not exceed the UL for vitamin A.

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