Dispelling myths about eating fish during pregnancy and early life

Are all salmon created equal?

Dr Cath Conlon
Interesting concept

• Docosahexaenoic acid (DHA, C22:6, ω-3) is an ancient nutrient for the modern human brain. One hypothesis is that the evolution of the modern human brain coincided with the inclusion of seafood in the diet.

• DHA is poorly represented in the land food supply.

• Since then DHA has been conserved as the principle lipid in the brain.
Women during pregnancy supplemented with LA & ALA acids

Supplementation did not prevent decreases in DHA & AA conc during pregnancy

de Groot 2004
Question 1: Why do we want women to eat fish during their pregnancy?

**Key Nutrients in Seafood:**

1. **Long chain omega-3 fats**
   - Mainly found in fish and seafood, these fatty acids are essential for optimal brain development.

2. **Iodine**
   - Seafood is in practice the only natural source of this crucial nutrient. Iodine serves several purposes like aiding thyroid function. It is also essential for neurodevelopment.

3. **Vitamin D**
   - Another nutrient crucial for mental development, this vitamin also regulates the immune system function and is essential for bone health.

4. **Iron**
   - During pregnancy, iron intake is crucial so that the mother can produce additional blood for herself and the baby.

5. **Calcium, zinc, other minerals**
   - Diets without dairy products often lack calcium, and zinc deficiency slows a child’s development.
So perhaps we have found the perfect brain food?
What are the benefits of eating fish?

• Nutritional benefits
  • Excellence source of high quality protein and essential omega-3 fatty acids as well as micronutrients such as iodine and selenium
  • Guidelines recommend eating a variety of protein-rich foods which include meat, poultry, fish, eggs, nuts and legumes.
  • High quality foods in the diet will replace other foods
  • Wealth of evidence on maternal and infant outcomes which supports DHA/fish intake during early life
Growing Fat: Importance of DHA
Key messages

• Babies need a preformed source of DHA to meet their requirements for growth and development
• Mothers need a preformed source of DHA to meet their own requirements
• Seafood is a rich source of DHA
Why DHA is important

- DHA conc in retinal and neuronal cell membranes
- Fetal brain growth spurt in the final trimester of pregnancy and first postnatal months
- At this time cerebral DHA increases dramatically
- Studies have shown that the fetus accumulates 65-70mg DHA per day during the final trimester of pregnancy
- During lactation a mother would supply her infant about 80mg DHA per litre of milk produced
- Such losses to either the fetus or infant exceed the intake of most pregnant and lactating mothers
Do pregnant women in NZ consume enough DHA?

Dietary intakes and food sources of omega-6 and omega-3 polyunsaturated fatty acids in pregnant women living in New Zealand

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## Current recommendations

<table>
<thead>
<tr>
<th>Total omega-3 DHA+EPA+DPA</th>
<th>NHMRC (Australia and New Zealand)</th>
<th>AI 110mg/d - 14-18yr&lt;br&gt;AI 115mg/d - 19-50yr&lt;br&gt;SDT 430mg/d - all adult women</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHA+EPA</td>
<td>WHO &amp; FAO</td>
<td>300mg/d</td>
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<tr>
<td></td>
<td>Australian Scientific Consensus Workshop</td>
<td>500mg/d</td>
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<tr>
<td>DHA</td>
<td>(ISSFAL, PERILIP) Consensus recommendations</td>
<td>At least 200mg/d (2 oily fish meals per week)</td>
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</table>
Aim: To ascertain the dietary intakes and food sources of omega-36 and omega-3 PUFAs in a convenience sample of pregnant women living in New Zealand.

• Assessed dietary intakes of omega-3 PUFAs in pregnant women living in NZ during their final trimester of pregnancy
• Used a validated online food frequency questionnaire which was designed for NZ
• Looked at food sources of DHA
• Asked whether women were taking supplements
• Most pregnant women were not meeting the recommended intakes for n-3 LC-PUFAs.
• 33% of participants not taking PUFA supplements had intakes below 65-70mg/d, estimated as daily fetal tissue accretion during the last trimester of pregnancy.
• Taking PUFA supplements significantly increased the chances of pregnant women achieving the recommendations for n-3 LC-PUFAs.

Main food Sources
Why don’t women eat fish during their pregnancy or if breastfeeding?

- Concerns about mercury
- General food safety concerns
- Don’t like the taste
- Concerns about mercury in breastmilk
- Cost
- Rest of the family don’t eat it (kids/husband)
Concerns about mercury

• The developing brain is extremely sensitive
• Mercury accumulates in the brain, potentially disturbing cognitive development
• Contamination of seafood is not the only source
• Concerns have been raised about the effects of low-level exposure
• Issue – substances that have the potential to cause developmental neurotoxicity may not be immediately apparent, but deficits may become evident later on
Concerns about mercury

How mercury builds up in fish

• Mercury occurs naturally in the environment and builds up in fish over time.

• Mercury levels in fish vary between species depending on habits and feeding patterns. Most species build up only low levels of mercury over their lives.

• Predatory fish at the top of the food chain, such as shark and swordfish, tend to accumulate higher levels of mercury. In fish species that live for a long time, high mercury levels are often found in older fish.
Outweighing the risks for mothers

- Assoc between high fish consumption and lower risk of pre-eclampsia (Makrides 2000) which occurs in about 10% of pregnancies in NZ (modulation of inflammatory and vascular effects).
- Supplementation with omega-3 fatty acids increase pregnancy duration and lower the risk of preterm birth (in women with a history of preterm delivery) (Olsen 2000)
- Mothers who rarely eat seafood or have low DHA breast milk conc are more likely to suffer from postpartum depression. Prevalence rates for PND range from 11 to 16% in NZ
Fish consumption during pregnancy and neurodevelopmental outcomes

• Infants at 6 mo using Visual Recognition Memory were found to have a significant improvement of 2.8 points for each additional serving of fish (85–140 g) consumed by the mother during pregnancy (Oken 2005)

• Gale et al. (2008) reported an improved IQ in offspring aged nine years in children born to mothers who consumed up to two servings of fish per week compared with children born to mothers who had not consumed any fish during late pregnancy. This association was not significant for fish consumption in early pregnancy (15 weeks gestation) suggesting that fish consumption may be of more benefit during the third trimester.
Fish consumption during pregnancy and neurodevelopmental outcomes

• The Avon Longitudinal Study of Parents and Children (ALSPAC) found that fish consumption during pregnancy (1-3 serves/wk) was shown to provide a significant improvement in developmental scores of the offspring for language and social activity at fifteen to eighteen months of age.

• A longer follow up of the ALSPAC cohort demonstrated a reduction in the percentage of children with suboptimal IQ at eight years of age amongst mothers with a high seafood intake (greater than 340 g) during pregnancy (Hibblin 2007).

• Results from a US cohort study demonstrated a significant improvement in IQ with consumption of more than two maternal servings of fish intake per week (Oken 2008).

• Results from a large Danish national birth cohort (n = 25,446) indicated a significant improvement in motor, cognitive and total developmental scores for eighteen month old children who were born to women within the highest three quintiles of fish intake during pregnancy.
Are women willing to eat fish during pregnancy?
A qualitative study of fish consumption during pregnancy  

- To determine knowledge, behaviours and advice received on consuming fish
- Focus groups with pregnant women
- Many women knew that fish contained a neurotoxin & had received advice to limit fish intake
- Few women knew that fish contained DHA or what its function was
- Because of the advice to limit fish intake and a lack of info on which fish contained mercury they avoided fish
- Pregnant women thought that receiving sound advice from a medical source would encourage them to eat fish.
Recommended servings for fish species to minimise mercury intakes

No restriction necessary

- Anchovy
- Arrow squid
- Barracouta
- Blue cod
- Brill/Turbot
- Brown trout (except from Lake Ellesmere)
- Cockles
- Eel, long or short finned
- Elephant fish
- Flounders
- Gurnard
- Hoki
- John Dory
- Monkfish or stargazer
- Mussels (green and blue)
- Orange perch
- Oysters (except Bluff and Pacific)
- Parore
- Scallops (except Queen)
- Rainbow trout (only from non-geothermal regions)
- Skipjack tuna (No data for yellowfin tuna)
- Sole (except Lemon sole)
- Southern blue whiting
- Surf clams (for example, tuatua)
- Tarakihi
- Toothfish, Antarctic
- Warehou (common, silver and white)
- Whitebait (Inanga)

3 – 4 servings a week acceptable

- Albacore tuna
- Alfonino
- Bass
- Bluenose
- Gemfish
- Ghost sharks
- Hake
- Hapuka (Groper)
- Javelin Fish
- Kahawai
- Kingfish
- Lake Taupo trout
- Leatherjacket
- Lemon sole
- Ling
- Mackerel (blue and jack)
- Orange Roughy
- Oreo dories
- Red cod
- Ribaldo
- Rig (Lemonfish, Spotted dogfish)
- Rock Lobster
- Salmon (farmed)
- Sea perch
- Silverside
- Skate
- Smooth oreo
- Snapper
- Sprats
- Trevally

1 serving every 1 to 2 weeks acceptable

- Cardinal fish
- Dogfish (excluding rig)
- Lake Rotomahana trout
- Lake trout from geothermal regions
- School shark (Greyboy, Tope)
- Marlin (striped)
- Southern bluefin tuna
- Swordfish
Eat fish except these:

Eating fish when pregnant

Eating fish during pregnancy is recommended as part of a well-balanced diet, because it is a nutritious food for you and your growing baby.

However, MPI advises that women who are pregnant or are considering pregnancy, limit their consumption of types of fish that contain higher levels of mercury.

These types of fish include:

- cardinalfish
- dogfish (excluding rig)
- Lake Rotomahana trout
- lake trout from geothermal regions
- school shark (greyboy, tope)
- marlin (striped)
- southern bluefin tuna
- swordfish.
Why don’t women eat fish during their pregnancy or if breastfeeding?

- Concerns about mercury
- General food safety concerns
- Don’t like the taste
- Concerns about mercury in breastmilk
- Cost
- Rest of the family don’t eat it
- (kids/husband)
General food safety advice for seafood intake during pregnancy

*Bluff and Pacific oysters and queen scallops contain more cadmium than other foods. We recommend you eat these shellfish only once a month during pregnancy.

<table>
<thead>
<tr>
<th>Seafood</th>
<th>Description</th>
<th>Advice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw fish</td>
<td>any raw fish (including marinated raw fish)</td>
<td>Don't eat</td>
</tr>
<tr>
<td>Raw shellfish</td>
<td>any raw shellfish (including marinated raw mussels)</td>
<td>Don't eat</td>
</tr>
<tr>
<td>Smoked fish, shellfish and crustacea</td>
<td>chilled, pre-cooked fish, mussels, oysters*, scallops*, salmon, crayfish, prawns, and similar</td>
<td>Don't eat unless heated until piping hot (over 70 degrees Celsius)</td>
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Myths about eating fish – and what advice you can give

• Fish tastes really strong
  • If you (or the family) don’t like that fishy taste opt for milder fish and pair with flavourful toppings such as fresh herbs, lemon or tomato
Myths about eating fish – You should avoid fish whilst breastfeeding

• Mercury concentrations in breastmilk are lower than in maternal blood samples (Children’s exposure to mercury compounds - WHO 2010 )
• Transfer of mercury into breastmilk is inefficient
• Any concerns then mothers can follow the same advice for pregnancy
Myth about eating fish – It is really expensive

Consumption of salmon v. salmon oil capsules: effects on n-3 PUFA and selenium status

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What can I do if my kids won’t eat fish?

• Try using fish in a dish with a more “meaty” feel. Burgers using tuna or salmon.

• Most people like kebabs – and they’re great for children and the BBQ.

• Substituting fish for chicken or beef in some of your favourite dishes like red curry.

• Use convenience products for lunches
Myths about eating fish – and what advice you can give

• **Frozen fish is not as good as fresh**
  
  • There are lots of great fish options in the freezer cabinet of your supermarket – fillets of white fish and various convenience options such as fish cakes, crumbed fish fillets. Frozen fish is great value for money and the freezing process seals in all the goodness like vitamins and omega-3s.
Myths about eating fish – canned fish is bad for you

• Various tinned and pouch options are available
• Canned fish are not a higher risk for mercury than fresh fish. The mercury content of fish is not affected by processing techniques such as cooking, canning or freezing.
• The tuna and small fish species (such as sardines, pilchards and herring) sold in cans in NZ are short-lived species which accumulate only low amounts of mercury.
How come I can eat ‘orange roughy 3-4 times week in NZ but not in Australia?

• Australia has its own species-specific recommendations for which fish types are safe to eat during pregnancy. Many of the fish species sold in Australia are different to those available in New Zealand (such as barramundi and catfish).

• Most come from different fishing grounds to those sold here and have different exposure levels. In addition, some fish with the same common name are different species. For example 'orange roughy' in Australia is also known there as 'sea perch' – but sea perch sold in New Zealand is an unrelated species.
Why not just take a supplement?

- Doesn’t have the same benefits as fish consumption
- Risk of exceeding the upper levels which are recommended
- Poor quality supplements may be oxidised
- Expensive
Are all Salmon created equal?

• The quality of fish will depend on their environment and food supply
• There will be differences between wild and farmed salmon and different species of salmon
• However fresh salmon and the range of convenience salmon products available in NZ can be safely consumed during pregnancy and will be a rich source of DHA