Small water thread about why supplementing omega-3 is completely retarded

First of all, what is omega-3?

Omega-3 fatty acids are essential polyunsaturated fats, this thread focuses on eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), as those are the ones humans can not sufficiently take in through plants and oil unlike α-linolenic acid (ALA). Technically humans have the possibility to convert ALA into EPA and DHA however conversion rates are highly inefficient at around 5-15% thus raising EPA and DHA is most effectively done through diet or supplementing, this thread will broadly cover both.

Why take omega-3?

"They show promise particularly in the prevention of cardiovascular disease [3], the treatment of inflammatory disease [4], improving early life neurodevelopment, preventing cognitive decline [5], and potential benefits to metabolism [6]."

The issue of supplementing omega-3 is oxidation, specifically the products resulting from it. Before going further into this, there are mainly 3 standardised ways to measure oxidation:

PV, Peroxide Value
This measures the primary oxidation (lipid peroxides) and indicates early-stage rancidity
The limit here is <5meq/kg

(p)AV, (p-)Anisidine Value
This measures secondary oxidation (Aldehydes) and reflects decomposition products of oxidized fats
The limit here is usually <20meq/kg, sometimes also generously <30meq/kg

On a side note, Aldehydes are also the reason why fats and oils stink/taste bad/rancid

TOTOX, Total Oxidation
This value is 2 * PV + AV and the limit is <26meq/kg

All limits here are taken from the Council for Responsible Nutrition (USA) or the Global Organization of EPA and DHA (GOED) and are not binding for industry.

There obviously have been studies on oxidation in omega-3 supplements, all using measuring methods as realistic as possible (measuring starts after buying random supplement cans, continues throughout the normal usage span/until date of expiry), just like you would intake it after buying and then keeping it where you live until its expired/fully used.

What these have found is that when bought, 50%-62% of supplements are already oxidized above the earlier mentioned limits, with atleast another 18% close to limit. {1, 2} Meaning that 68%-80% being severely oxidized when taken in, this increases over time as oxidization goes on and also just because the levels are lower than limit doesnt mean its healthy either, the oxidization is just not in a too dangerous area.

In rat studies, consistently feeding the animals those supplements with oxidized polyunsaturated fatty acids "led to growth retardation, intestinal irritation, liver and kidney enlargement, haemolytic anaemia, decreased vitamin E, increased lipid peroxides,[...]", the resulting lipid peroxides also "caused liver/kidney changes, inflammation, anemia and tissue damage in animal studies". {2}

So taking omega-3 supplements and their oxPUFAs fucks up your growth, organs, essential antioxidants and results in more oxidation products that also fuck up your organs and tissue, nice!

How do we achieve normal omega-3 intake without oxidation?

Simple answer, as said before EPA and DHA can be raised through supplementing, which obviously does not work healthily, or simply diet.

The main difference is that while still in the fish, the omega-3 is bound in cells, protected from oxidation by their membranes and lots of antioxidants like Vitamin E and tocopherols.

This also shows in studies on omega-3 oxidation in/ from fish. Direct fish (oil) omega-3 intake shows no increase in peroxide lipids {3}

Soyboy counterarguments against fish:

"Muh heavy metal poisoning"

This concern is about mercury, more specifically methylmercury which is indees present in fish and not necessarily in small amounts. However, the methylmercury, due to its high affinity to selenium, which is also present in fish, gets bound by the latter into extremely stable equimolar compounds, thus a 1:1 ratio would theoretically be enough and fulfilled by all fish I suggest later on.

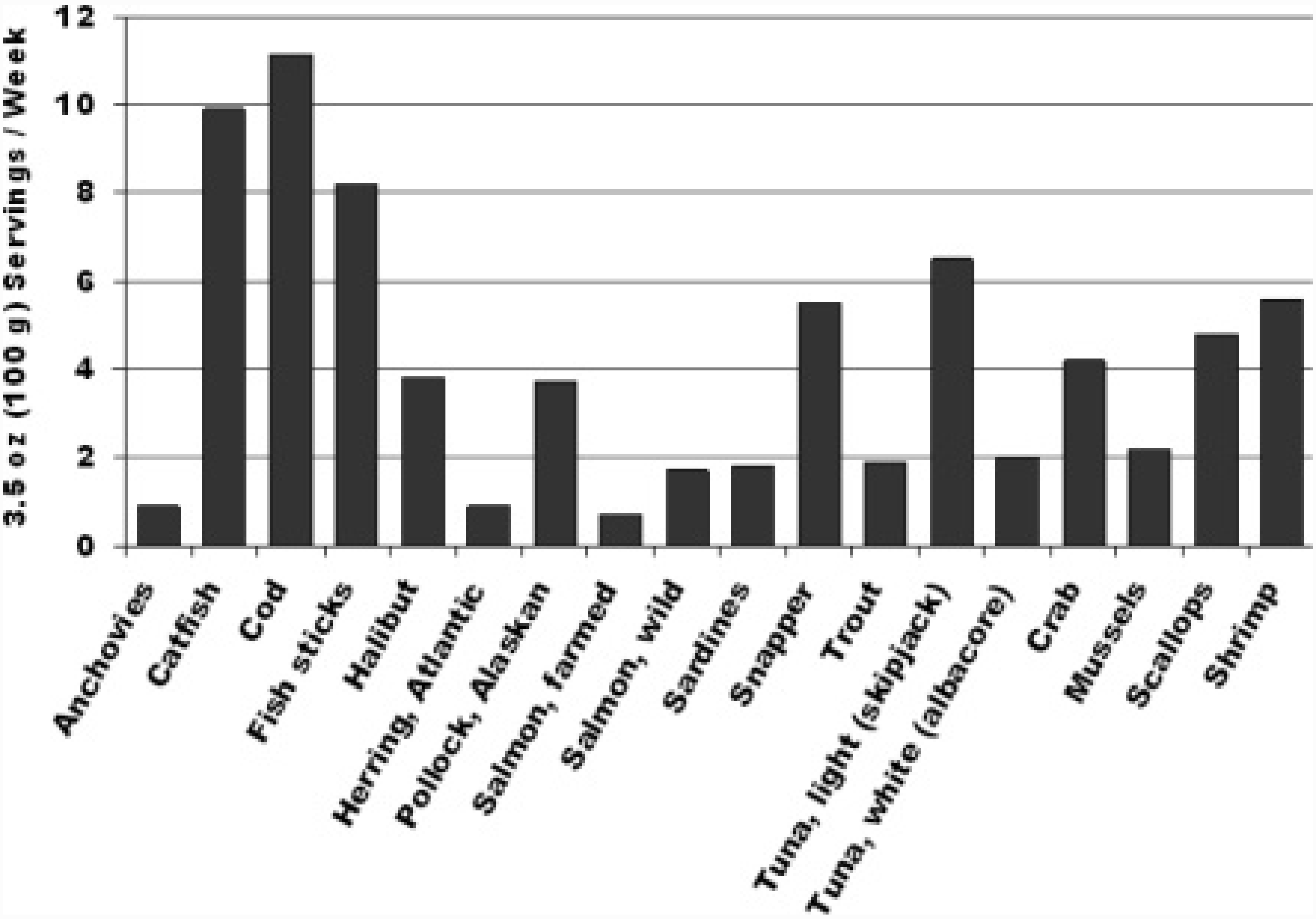
Sardine (Pilchardus)
MeHg: 0,01–0,3 mg/kg
Selenium: 0,1–0,6 mg/kg

Salmon (Atlantic/Pacific)
MeHg: ~0,01–0,06 mg/kg
Selenium: ~0,3–0,7 mg/kg

Tuna
MeHg: ~0,03–0,9 mg/kg
Selenium:~0,3–1,2 mg/kg

Although the binding happens on a 1:1 ratio {4} that is not enough to fully protect from methylmercury/to gain full health benefits {5}. A ratio >1:1 adds additional protective gains by giving an unbound selenium buffer which is crucial for sustaining selenoproteins (antioxidant enzymes) because interaction with mercury disrupts those.

In total effect, "methylmercury may modestly decrease the cardiovascular benefits of fish intake.", which at first glance sounds negative but actually proves a net-benefit. A fish rich diet reduces coronary death risk by 36% and lowers total mortality by 17%, methylmercury could partly reduce this benefit, but not reverse it, further proving that the methylmercury is a no risk part of eating fish. The only "but" here is that “Women of childbearing age and nursing mothers should consume 2 seafood servings/wk, limiting intake of selected species.” and similarly, “Individuals with very high consumption (≥5 servings/wk) should limit intake of species highest in mercury levels.” {6}



The number of 3.5 oz (100 g) fish servings per week needed to provide an average of 250 mg/day of the marine n-3 polyunsaturated fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Based on data from Mozaffarian and Rimm [x]

For the soyboy "fish is too pricey" argument, I will compare price/nutrients of three commonly eaten fishes, (representing small, medium and large fish species) in 100g servings, to the same amount of nutrients in supplements and their cost.

(European) Sardines per 100g

208kcal

24,6g protein

11,5 g total fat

142mg cholesterol

0,5g EPA

0,8g DHA

1,5 g total omega-3

4,8mcg Vitamin D

8,9mcg Vitamin B12

52,7mcg Selenium

490mg Phosphorus

397mg Potassium

39mg Magnesium

307mg Sodium

(Atlantic) Salmon per 100g

206kcal

20,4g protein

13,4g total fat

55mg cholesterol

0,7g EPA

1,5 g DHA

2,3 g total omega-3

11,1mcg Vitamin D

3,2mcg Vitamin B12

36,5mcg Selenium

200 mcg Phosphorus

363mg Potassium

27mg Magnesium

59mg Sodium

(Albacore & Skipjack midpoint) Tuna per 100g

120kcal

23,5g protein

3,0g total fat

0,3g EPA

0,4g DHA

0,7g total omega-3

4,0mcg Vitamin D

3,8mcg Vitamin B12

80,0mcg Selenium

245mg Phosphorus

410mg Potassium

42mg Magnesium

40mg Sodium

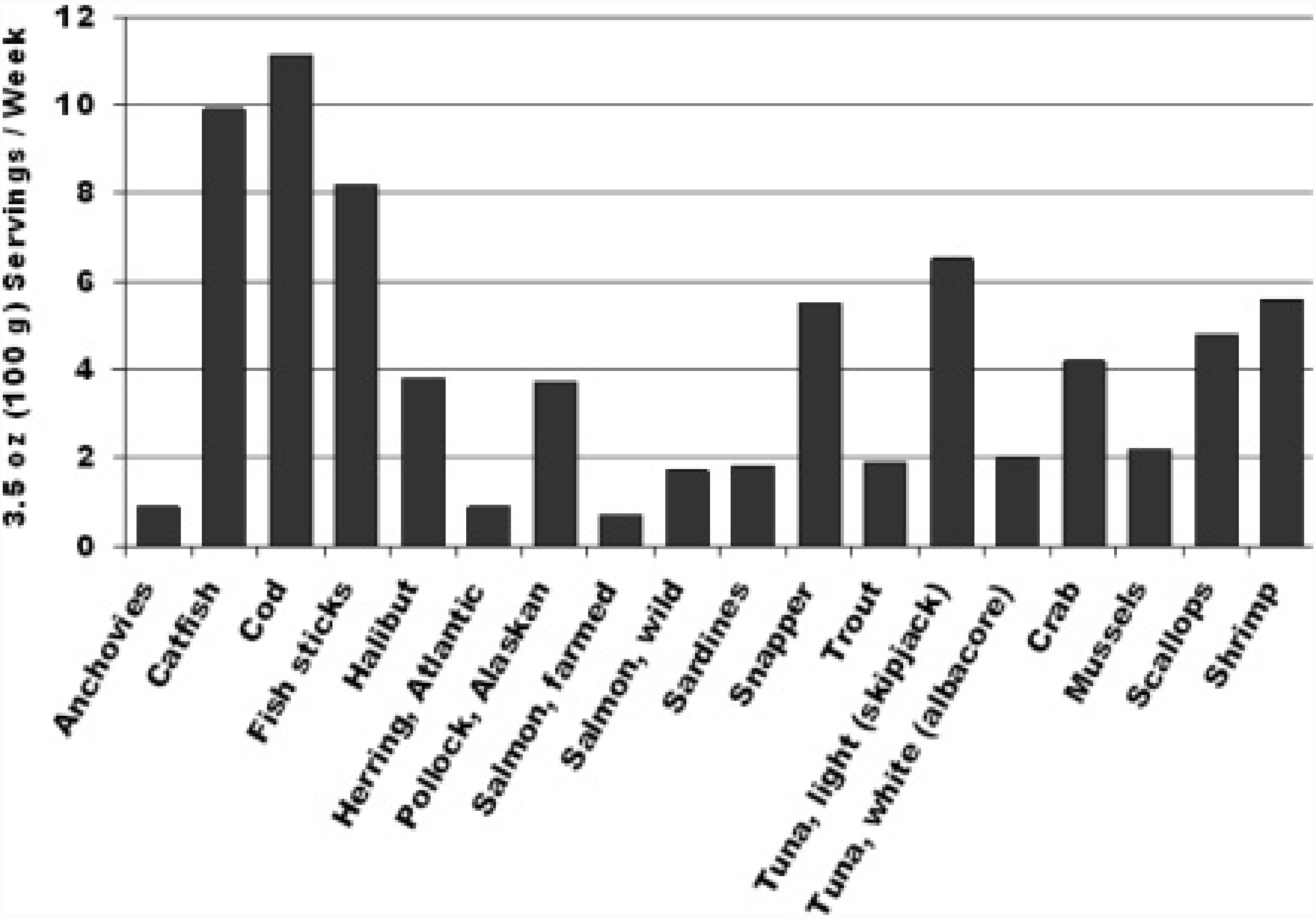
Total cost to supplement nutrients with EU/US avg. market prices

Sardines 0,80€/0,78$

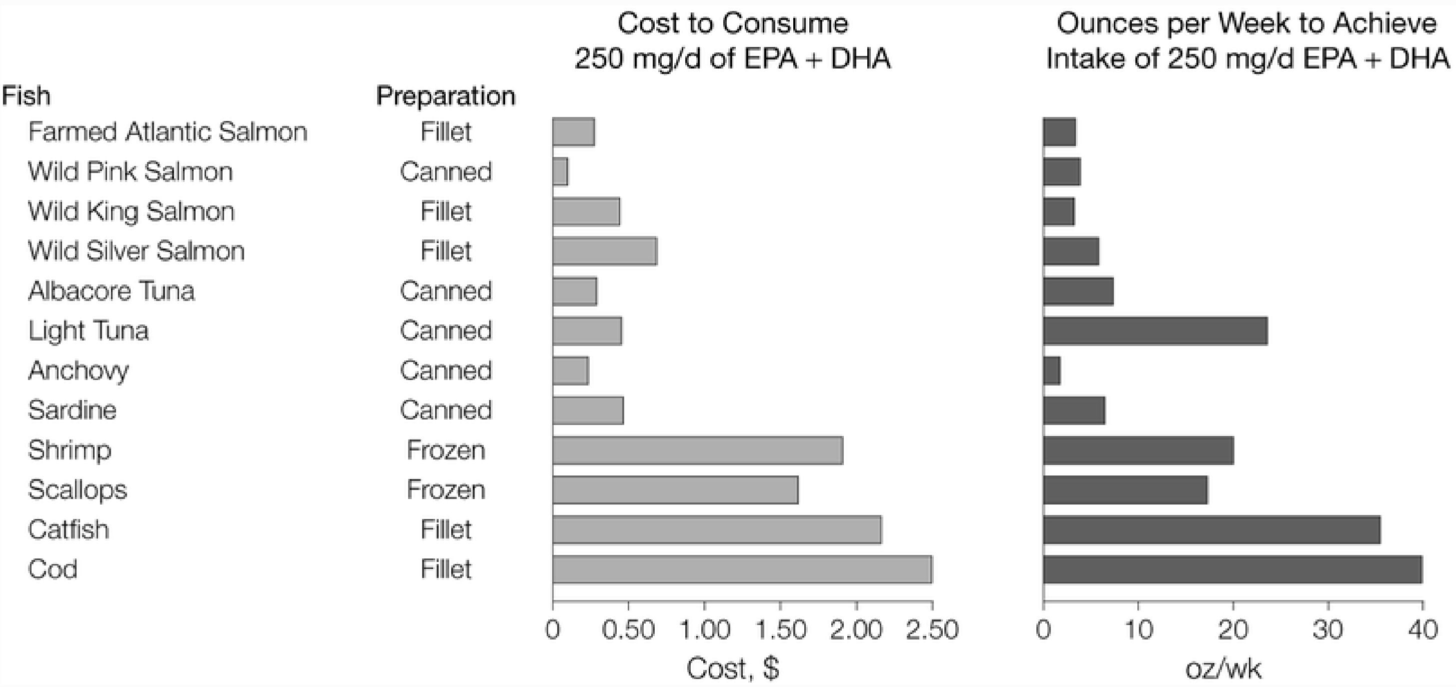
Salmon 1,12€/1,06$

Tuna 0,48€/0,50$

Knowing the necessary weekly 100g servings to achieve a healthy 250mg daily average of EPA and DHA we can seperately calculate the cost to replace the total nutritients via supplements which I will do later but we should first acknowledge that the JAMA report already did this for the EPA and DHA replacement and also made a graphic on this



First to note their calculation was made "[...] based on retail prices (averaging the most commonly sold items in each of 6 US cities in the east, midwest, and south from a national online grocery store or, for wild king and silver salmon, from online retailers [...]", they concluded that the "least expensive was canned pink salmon (9 cents/250 mg of EPA + DHA)" and "the average cost per 250 mg of EPA + DHA for these 12 types of seafood was 92 cents.". (Hatte hier einen Satz angefangen kann mich nicht mehr erinnern)



It came to the conclusion that most listed fishes come in cheaper to consume than the supplementing, when including other nutrients and at a slightly higher cost when compared to EPA/DHA only.

Sources

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