CODEX ALIMENTARIUS COMMISSION

Food and Agriculture Organization of the United Nations

World Health Organization

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Agenda Items 8, 13 **CRD28**

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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON CONTAMINANTS IN FOODS

15th Session
Virtual
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Comments of the National Health Federation (NHF)

Agenda Item 8 and 13: CX/CF 22/15/8

SUPPORT FOR TAKING INTO ACCOUNT SELENIUM LEVELS IN FISH WHEN ESTABLISING SAFE METHYL MERCURY LEVELS IN FISH

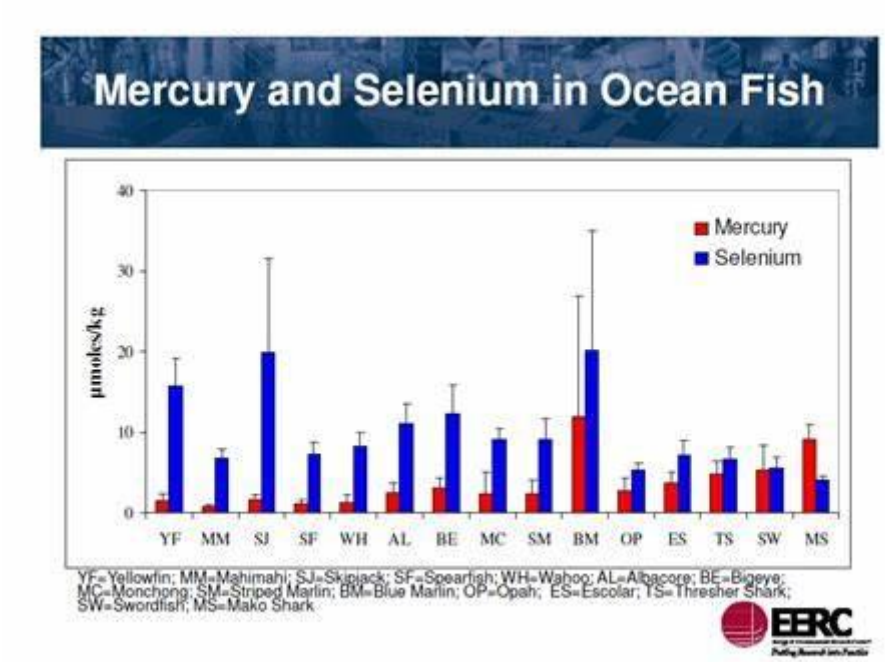
Respectfully submitted by the National Health Federation (NHF), a non-profit consumer organization, to the honorable Codex delegations at CCCF15 for their consideration:

One of Codex's noble goals is to establish Maximum Levels for methyl mercury in sea and other fish. While NHF supports this work, our organization must point out to its fellow Codex delegates what it has mentioned at previous CCCF meetings: **that when setting MLs for methylmercury, consideration should also be given to selenium content in fish as research has shown that mercury is toxic because it binds to selenium enzymes, thereby preventing the enzymes' proper function, so it is the ratio of selenium to mercury in fish that determines methylmercury's toxicity and not its absolute level in fish.**

It's Important to Determine Selenium Levels

Researchers John Kaneko and Nicholas Ralston in their 2007 published study "Selenium and Mercury in pelagic fish in the central north pacific near Hawaii," made the following observations and conclusions:

"Protective effects of selenium against mercury toxicity have been demonstrated in all animal models evaluated. As interactions between selenium and mercury and their molar ratios in seafood are essential factors in evaluating risks associated with dietary mercury exposure, considering mercury content alone is inadequate. In this study, the absolute and molar concentrations of mercury and selenium were determined in edible portions from 420 individual fish representing 15 species of pelagic fish collected from the central North Pacific Ocean near Hawaii. Selenium was in molar excess of mercury in almost all fish species evaluated. The rank order of mean Se/Hg molar ratios was striped marlin (17.6) > yellowfin tuna (14.1) > mahimahi (13.1) > skipjack tuna (12.8) > spearfish (11.4) > wahoo (10.8) > sickle pomfret (6.7) > albacore tuna (5.3) > bigeye tuna (5.2) > blue marlin (4.1) > escolar (2.4) > opah (2.3) > thresher shark (1.5) > swordfish (1.2) > mako shark (0.5). With a Se/Hg molar ratio of less than 1, mako shark was the only fish containing a net molar excess of mercury. A selenium health benefit value based on the absolute amounts and relative proportions of selenium and mercury in seafood is proposed as a more comprehensive seafood safety criterion."[i]



In 2019, Chris Kresser[ii] wrote that,

"We've known about the role of selenium in preventing mercury toxicity for at least 45 years, with the first research report on this topic appearing in 1967.[iii] Since then several studies have shown that selenium consistently and predictably counteracts the adverse effects of mercury exposure.

"How does selenium do this?

"Exposure to mercury is harmful because it deactivates special selenium-dependent enzymes—called selenoenzymes. Since the brain consumes nearly 25% of the oxygen we breathe, it continuously produces oxygen by-products that can damage the fats and proteins that make up the brain. Selenoenzymes are extremely important in the brain because several of them prevent oxidative damage while others actually reverse it.

"In the past, researchers thought selenium was protective because it binds to mercury and prevents mercury from harming other molecules. This led to the mistaken idea that mercury causes harm in the body until selenium binds it. But our current understanding is almost the reverse: it's not that selenium prevents mercury toxicity by binding to mercury, but that mercury interferes with selenonzyme function by binding to selenium. In fact, mercury cannot cause harm until it occurs in high enough amounts to inhibit a significant percentage of selenoenzyme activities. Mercury is only harmful *because it binds to selenium and prevents it from performing its vital roles in the brain*.

"As long as you are eating fish that contains more selenium than mercury, the amount of selenium in the body will always be in plentiful excess of mercury. That means that these essential selenoenzymes are never inhibited to a meaningful degree. Fortunately, the vast majority of fish most people consume **have more selenium than mercury**. The exceptions are pilot whale, shark, tilefish, king mackerel and swordfish.

"Unfortunately, the well-documented protective effect of selenium is consistently ignored in both the medical community and the media when reporting on potential harms from fish consumption. This is almost certainly causing harm, as it has led to advising pregnant women and young children to eat less fish, when we should instead be telling them to eat more."[iv]

Conclusion

The National Health Federation wants to alert this Committee and its delegates to the fact that there exists a very important factor to consider (and question to ask) when setting Maximum Levels for methyl mercury in any fish: What are the fish's levels of selenium compared to mercury?

Those fish – such as tuna – with high levels of selenium are far safer to consume even in the presence of notable mercury levels than are those fish – such as shark – that lack sufficient or even any noticeable levels of selenium.

Therefore, selenium levels of fish species must be considered in setting Maximum Levels of methyl mercury in fish. This would be a more sophisticated way of setting such levels and one that would result in less fish wastage while still ensuring consumer health.

[i] Kaneko JJ & Ralston NVC, "Selenium and Mercury in pelagic fish in the central north pacific near Hawaii," *Biol Trace Elem Res*, 2007 Dec;119(3):242-54, doi: 10.1007/s12011-007-8004-8, at https://pubmed.ncbi.nlm.nih.gov/17916947/.

[ii] Chris Kresser, M.S., L.Ac., is a renowned expert, leading clinician, and top educator in the field of Functional Medicine, and the *New York Times*-bestselling author of *The Paleo Cure*. Listed among the 100 most influential people in health and fitness by Greatist.com, he was awarded "Best Inspirational Voice" and "Best Health & Wellness Website" by *Paleo* magazine in 2019. His latest book is *Unconventional Medicine*. Co-director of the California Center for Functional Medicine, he founded **The Kresser Institute** in 2015 to provide functional health practitioners and coaches with the skills and tools needed to turn the tide of chronic disease—and change the future of medicine.

[iii] Parízek J, Ostádalová I, "The protective effect of small amounts of selenite in sublimate intoxication," *Experientia*, 1967 Feb 15;23(2):142-3, doi: 10.1007/BF02135970, at https://pubmed.ncbi.nlm.nih.gov/6032113/.

[iv] Chris Kresser, "5 Reasons Why Concerns about Mercury in Fish Are Misguided," Chris Kresser blog, June 19, 2019, at https://chriskresser.com/5-reasons-why-concerns-about-mercury-in-fish-are-misguided/.