

Misleading Mercury-exposure Comparisons: Thimerosal-preserved Flu Shot Versus the Eating of Tuna Fish

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Initial Comments

First of all the common statement:

“My doctor says there is more mercury in a can of tuna fish than in a vaccination”

is intentionally misleading for several reasons including, but not limited to:

- A. The statement provides no basis values for comparison;
- B. It ignores the differences in the mode of administration between tuna fish (which is eaten) and a vaccine (which is injected);
- C. It ignores the reality that really young (< 1-year-old) American children do not eat any tuna fish but they are allowed be given Thimerosal-preserved vaccine doses – including,
 1. In 2009, twice as many doses of flu shots that they would have been recommended to receive prior to 2009 and
 2. Infinitely more than the dose of Thimerosal they would have been recommended to receive from a flu shot before 2002 because, prior to 2002,
 - a. The U.S. Centers for Disease Control and Prevention (CDC) did not recommend that children get a Thimerosal-preserved flu shot and
 - b. All U.S. Food and Drug Administration-approved [FDA-approved] flu vaccines were Thimerosal-preserved inactivated-influenza vaccines);
- D. It ignores the reality that most of the mercury in the tuna fish that is eaten is not absorbed by the human body but excreted in the feces w/o being absorbed, and
- E. It ignores the CRITICAL difference in peak dose where:
 1. The maximum level of Hg from the vaccination occurs almost immediately after injection; but
 2. The maximum level in the mercury absorbed from eating fish:
 - a. Takes hours to be reached and
 - b. Is only some fraction of the dose in the eaten tuna fish is absorbed [from animal studies, the fraction absorbed is typically <25 % of the dose consumed].

The Mercury (Hg) In A “Can of Tuna Fish”

Considering the preceding realities, let us examine some FACTS about the amount (maximum dose) of Hg in a 6-oz can of Albacore tuna fish:

- A. IF we use the test results posted by the U.S. Environmental Protection Agency (EPA)¹,
- B. THEN: the amount of Hg that is in a given 6 ounce (170 gram) can of Albacore tuna fish ranges from not detectable (ND, with a detection limit of 0.01 micrograms of Hg per gram of tuna fish [< 1.7 microgram Hg] to 145 micrograms of Hg depending roughly on the size (age) of the tuna fish that ends up being packed in the can, AND
- C. The principal Hg compound in fish is probably a protein bound form of methylmercury cysteine (nominal formula weight of 335.77 [59.74 % Hg by weight]).

¹ <http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/Seafood/FoodbornePathogensContaminants/Methylmercury/ucm115644.htm>, last visited 24 November 2009.

The Mercury (Hg) in a Dose of a Thimerosal-preserved Inactivated-influenza Vaccine Formulated at a Nominal Thimerosal Level of 0.01 %

For a Thimerosal-preserved vaccine, where the nominal level of Thimerosal, sodium ethyl mercury thiosalicylate (nominal formula weight 404.81 [49.55% Hg by weight]), is 100 micrograms of Thimerosal/mL of vaccine, the actual level in a given vaccine lot is allowed to vary between 75% and 125% of the nominal level; or from 75 micrograms to 125 micrograms of Thimerosal per mL of vaccine (37.2 to 61.9 micrograms of Hg/mL)².

However, the vaccination dose ranges from 0.25 mL to 0.5 mL to, in the bird flu vaccine, 1.0 mL of vaccine so the crude mercury answer, taking into account all of the preceding factors is:

- A. **FROM:** 0.75 (least allowable fraction of nominal level) x 0.4955 (fraction mercury in Thimerosal) x nominal 100 micrograms of Thimerosal/ mL x 0.25 mL = 9.3 micrograms of Hg (lowest amount for a 0.25-mL dose);
- B. **TO:** 1.25 (highest allowable fraction of nominal level) x 0.4955 x 100 micrograms of Thimerosal/mL x 1 ml = 61.9 micrograms of Hg (highest amount for a 1.0-mL dose).

SCENARIO 1:

The <1-year-old American Child

Though young children (< 1 year of age) typically do NOT eat tuna fish³, in 2009, they are recommended to get up to four (4), 0.25 mL doses of influenza vaccinations (2 "seasonal" and 2 "Swine flu") between the ages of 6 and 7 months and Thimerosal-preserved influenza vaccines are allowed to be used.

Thus, for a fully vaccinated child, the maximum dose of mercury from these 4 vaccinations will be:

37.2 to 61.9 micrograms of Hg

(with a peak dose of **9.3 to 15.5** micrograms/day if all 4 vaccines are given on 4 different days or a peak dose of **18.6 to 31.0** micrograms/day if given on 2 days [as the instructions permit] plus whatever background daily mercury intake they have from other sources),

and the peak tuna-fish dose will be: **"ZERO"** micrograms of Hg

(or, when the mother⁴ breastfeeds and eats tuna fish occasionally³, " ≤ 0.55 " micrograms of Hg/day).

² Based on limited assays of Thimerosal-preserved vaccines, most lots seem to have a Thimerosal level above the target level of 100 microgram/

³ Independent studies of breast-fed children indicate that the total mercury dose from breast milk is about half of the total dose of mercury that a child used to get from breast milk plus the "100micrograms of mercury" from the early childhood vaccines. Translating the "100 micrograms of Hg" from breast milk in 6 months to micrograms/day (100 micrograms/182.5 days) gives a daily maximum (peak) daily level of 0.55 micrograms of Hg/day. However, the vaccine exposures in that scenario were "100 mcg of vaccine mercury" on 4 particular days or a peak level of 25.55 micrograms/day – 46.45 times higher. Presuming the same scenario for breast feeding (peak dose = 0.55 micrograms of Hg/day) and dosing on 4 different dates, the peak vaccine dose in Scenario 1 is 9.85 to 16.025 or 17.9 to 29.1 times higher than breast milk alone. However, since the inactivated "seasonal" and "Swine flu" vaccines are allowed to be given on the same day, the maximum peak doses for the influenza vaccines are 19.15 to 31.45 micrograms of Hg/day or 34.82 to 57.18 times the putative breast-milk daily level – peak daily levels in the same range as the previous early vaccine schedule

⁴ Since the young child's mother is recommended to receive two (2; 1 seasonal and 1 "Swine flu"), 0.5-mL inactivated-influenza inoculations; Thimerosal-preserved doses are allowed to be used; and most available doses are Thimerosal-preserved doses, in 2009, these young children may have also been exposed to an additional 37.2 to 61.9 micrograms of Hg – for a total exposure to

In **Scenario 1**, no matter how many Thimerosal-preserved flu shots are given, the dose of mercury the child receives from his or her inoculations is higher than the dose of mercury that a child receives from eating tuna because newborn American children do **not** eat tuna.

SCENARIO 2:

Three-year-old American Child Living in a House, Where the Child Eats Tuna-fish in the Form of a Tuna-fish Sandwich, and the Parent Makes Three (3) Sandwiches from One (1) Can Of Tuna fish Versus One (to Four), Versus a 0.5-mL Thimerosal-preserved Flu Shot

The Tuna-fish Sandwich

The dose of mercury in the tuna-fish sandwich (**see: Initial Comments**) would range from ND (“< 1.7”) to 145 micrograms of Hg divided by 3 or ND [“< 0.6”) to 48.3 micrograms of Hg.

Presuming an absorption of 30% (where the typical absorption is no more than 25% and probably < 20 %) yields: **ND [“< 0.2”) to 14.5** micrograms of Hg.

The Thimerosal-preserved Flu Shot

For this child getting a single 0.5-mL Thimerosal-preserved flu shot, the Hg level is (0.75 to 1.25) times 100 micrograms of Thimerosal/mL x 0.5 mL injected x 0.4955 (weight fraction of Hg in Thimerosal) yields: **18.6 to 37.2** micrograms of Hg⁵.

SCENARIO 3:

The 2009 American Adult Eating Two Tuna-fish Sandwiches, Where one 6-oz Can of Tuna fish is Used Make the Sandwiches, Versus a 0.5-mL Thimerosal-preserved Flu Shot

The Tuna-fish Sandwiches

The dose of mercury in the two tuna-fish sandwiches (**see: Initial Comments**) would range from two times ND (“< 1.7”) to 145 micrograms of Hg divided by three or: ND [“< 1.1”) to 96.67 micrograms of Hg.

Presuming an absorption of 30% (where the typical absorption is no more than 25% and probably < 20 %) results in: **ND [“< 0.34”) to 29.0** micrograms of Hg.

The Thimerosal-preserved Flu Shot

For this adult getting a single 0.5-mL Thimerosal-preserved flu shot, the Hg level is (0.75 to 1.25) times 100 micrograms of Thimerosal/mL x 0.5 mL injected x 0.4955 (weight fraction of Hg in

74.4 to 123.8 micrograms of Hg from vaccines. Of course, the pregnant mother may be exposed to some mercury from fish, but pregnant women are warned to restrict their intake of fish and eat those fish that are low in mercury. If the pregnant mother observes these governmental admonitions and only eats canned salmon (where the level is < 0.01 microgram of Hg/gram of fish) infrequently, then the developing child's in utero exposure to dietary mercury should be < 1 microgram across her pregnancy and have no effect on the developing fetus. [Note: Some negative neurodevelopmental effects have been reported from dental mercury release from mercury-silver (“silver amalgam”) dental fillings when the number of fillings the pregnant woman has exceeds 4 large fillings.]

⁵ Of course, in 2009, where the 3-year-old child is recommended to get: **a)** a single seasonal flu inoculation, **b)** unless he or she has not had a flu inoculation previously – where two “seasonal flu shots are recommended, and **c)** two (2), 0.5-mL “Swine flu” inoculations and all influenza vaccine doses are Thimerosal-preserved doses, then the three-year-old child may receive a total Thimerosal-mercury dose of 74.4 to 148.8 micrograms of Hg in daily bolus doses of up to half the total because the “seasonal” and “Swine flu” inoculations are allowed to be given at the same time when the vaccines are inactivated-influenza vaccines.

Thimerosal) yields:

18.6 to 37.2 micrograms of Hg

Analysis the Scenario Findings

Based on the preceding, the reader should see that the attempted comparison is misleading because it ignores the reality that not only is the level of Hg in tuna fish highly variable but also the amount of mercury that the person eating the tuna fish is much less than the amount in the tuna fish consumed because humans have protective mechanisms that tend to inhibit the absorption of the toxins that may be present in the foods they routinely eat.

Of course, given the variability of the Hg level in tuna fish, the variability in the percentage of a can of tuna fish that a person may consume and the variability in the absorption of the mercury in that tuna fish into the person, it is possible to create example scenarios where the mercury dose absorbed from eating the tuna fish exceeds the Hg dose from a vaccine.

However, given the realities outlined above and the fact that the area of most concern is the PEAK level of organic Hg exposure that very young children (from conception to 3 years of age) receive – the dose of mercury from Thimerosal-preserved flu shots is a far larger concern than the mercury exposure from an occasional meal containing some tuna fish⁶.

Thus, the preceding discussion has provided the reader with the “ammunition” that he or she needs to “shoot down” any doctor or other person who would try to make this or any similar such invalid comparisons of what is in the container (6-oz can of tuna fish or 0.5-mL of a Thimerosal-preserved vaccine) when, *to be even somewhat valid*, the comparison should be between the PEAK level in the Hg absorbed from the amount of tuna consumed and the PEAK level of Hg delivered by the vaccination where all of the Hg is absorbed just after a Thimerosal-preserved vaccine is injected.

The critical need to assess the PEAK mercury level arises because the human body has an internal Hg detox system which has only a small detox capacity (in terms of PEAK micrograms of Hg absorbed in a given time period).

Unfortunately, this “PEAK DOSE” reality is more critical for Thimerosal and/or its mercury-containing breakdown products because they have been shown to less-than-reversibly poison the human internal heavy-metal detoxification system whenever the level of mercury significantly exceeds the short-term (acute) detox capacity of the individual who has received the dose.

⁶ Although, if I were the parent, I and my child would eat salmon fish sandwiches made from canned salmon, where there is no detectable level of mercury in the 23 samples the EPA examined (limit of detection 0.01 ppm [10 ppb]) and, for family meals, we would eat fresh/frozen salmon, where the highest level found was 0.19 ppm and the average level in the samples with a detectable level of Hg was 0.041 ppm.

Concluding Remarks

Should any reader find significant factual errors in either of this editorial, then please e-mail the author your proposed corrections to the editorial along with e-mail attachments that contain copies of the published documents and studies that prove your claims.

Then, *as has been the case in the past*, after verifying your claims, the confirmed factual errors will be corrected and a corrected document will be posted.

Also, if you find spelling or punctuation errors, please also send them in so that this document can be appropriately updated and posted as a “revised editorial”.

Respectfully,

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