Calculating Exposure to Mercury from fish

Mercury in Fish Poisons Broadway Actor

December 18th, 2008

Variety Magazine has reported that Jeremy Piven will abruptly end his run in Broadway's "Speed-the-Plow," after missing Tuesday evening's performance and a Wednesday matinee due to mercury poisoning from eating too much sushi.

The news came days after the U. S. FDA's plans to rescind heatlh advisories for mercury-contaminated fish was made public, and putting tuna and swordfish profits before mothers, children and other people who like to eat fish.

CNN reported on the problems of mercury in fish this week and the irresponsible FDA actions.

"Entertainment Tonight" talked to Piven's doctor and will report on air:

Dr. Carlon Colker, a doctor who has been treating the SAG award nominee and Emmy award-winner, says that Jeremy is suffering from extreme mercury toxicity. Colker tells ET that Jeremy has been an avid sushi eater for many years, regularly eating sushi twice in one day. Colker tells ET that a major symptom of mercury poisoning is extreme fatigue.

In addition, Jeremy began experiencing neuro-muscular dysfunction late last week, which led to extreme difficulty in lifting his arms and legs. Then, this past Sunday, he began feeling dizzy. Now, the doctors have ordered enforced rest. Jeremy spent three days in the hospital recently and the doctor tells us exclusively that he is no longer in New York.

He informs us that a test revealed that Jeremy had the highest level of mercury that he has ever seen, which amounts to six times a healthy amount of mercury, in his system.

Eleanour Snow, esnow@jsg.utexas.edu

Calculating Exposure to Mercury from fish

About the Problem:

Mercury is a heavy metal, and a very powerful neurotoxin, which causes various neurological problems even at relatively low doses, as the story above illustrates. Mercury exposure is particularly dangerous to babies *in utero* and young children with developing nervous systems. For this reason, women of child-bearing age should be aware of the possibility of exposure to mercury through seafood. Nearly all fish, both freshwater and marine, contain some mercury.

However, fish is an important dietary component for many people, including pregnant women. It provides many helpful nutrients, particularly omega-3 fatty acids, so fish should not be eliminated from the diet of younger women. Older women and men can tolerate higher levels of exposure, but careful selection of fish species is still warranted as no 'safe' level of mercury has been determined. Again, both men and women can obtain significant dietary benefit by including fish in their diet, but also by limiting consumption of fish species known to have higher levels of mercury.

Your Challenge:

For this exercise, you will calculate the weekly dose of mercury from eating **Sunday Dinner** of various types of fish for three different individuals (one meal in a week). You will then compare this dose to the EPA recommended limits for dietary exposure to mercury. The three individuals are a 190 lb man, a 135 lb woman of child-bearing age, and a 45 lb child. The man and woman eat 6 ounces of fish at the meal. The child eats 3 ounces at the meal.

Data:

US EPA recommended <u>daily</u> dose of mercury is 0.10 micrograms per kilogram of body weight. Pregnant women or women who may become pregnant should limit exposure to 0.050 micrograms of mercury <u>daily</u> per kilogram of body weight.

<u>Useful numbers</u>

1.0 ounce = 28.4 grams
0.45 kilograms = 1.0 pound
1.0 microgram per gram is 1 part per million (ppm)

Eleanour Snow, esnow@jsg.utexas.edu

Calculating Exposure to Mercury from fish

Fish species	mercury level in micrograms per gram
Tuna, canned, light	0.12
Tuna, canned, Albacore	0.35
Swordfish	0.98
Flounder	0.045
Salmon, fresh, Alaska	0.014
Grouper, fresh	0.46
Shark, fresh	0.99
Shrimp	0.025
Catfish	0.049
Bass, large mouth	0.22
Bass, Chilean Sea	0.386

Procedure: Show the calculations and final answers for each step. The most straightforward way to do this is with Excel. That way you put in the formula once, and calculate many iterations. Be sure to include in your table all the formulas in a way I can read them (see the example below). Be sure to put all your excel calculations into your final report. Final answers should be rounded to 2 significant figures [e.g., 54, 5.4, 0.54, 0.054, etc.].

Step 1: For each individual, calculate the EPA recommended daily dose of mercury

- convert body weight in lb to kg
- multiply body weight in kg by 0.1 or 0.05 to get to the maximum daily mercury dose in micrograms for a man or child (0.1) or a young woman (0.05)
- multiply the maximum daily dose by 7 to get the maximum weekly dose

Step 2: Calculate the mercury content of each meal for each individual.

- convert the size of each meal in ounces to grams
- calculate the mercury dose of each meal, in micrograms, by multiplying the weight of the meal in grams by the mercury content in micrograms per gram (ppm) for each species.

Step 3: Calculate the % of the EPA weekly maximum mercury dose each individual would consume for each species*.

- For each individual, divide the weekly mercury intake for each species consumed by the maximum weekly dose recommended by the EPA, and multiply by 100 to convert to a percentage.

Eleanour Snow, esnow@jsg.utexas.edu

Calculating Exposure to Mercury from fish

Using your data, answer the following questions. Show any necessary calculations.

1. Does one meal per week of any of the fish species exceed the weekly EPA recommended mercury exposure for a man, a woman of child-bearing age, or a child? If yes, list the species and the % of the EPA maximum weekly exposure.
2. How many 3-ounce servings of canned albacore tuna consumed each week would exceed the EPA-recommended weekly mercury limit for a 45 lb child?
3. How many 6-ounce servings of flounder could a woman of child-bearing age eat each week and not exceed the recommended weekly limit for mercury?
4. How much tuna sushi could a 170 lb man eat each week, in ounces, and not exceed the recommended weekly limit of mercury?

Example: Excel calculation with formula

	lbs	kg (formula: =lbs*0.45)
Tom	220	99
Julie	100	45
Hammie	62	27.9

Sources:

This assignment has been used and modified and used again at University of South Florida for many years. I think the original came from Tom Juster, Geosciences, University of South Florida

http://www.pbs.org/now/science/mercuryinfish.html

[http://www.seaturtles.org/article.php?id=1243]

Eleanour Snow, esnow@jsg.utexas.edu