

Reply to Senator Collins on Reducing Harmful Mercury

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Senator Collins' opinion piece in the Magic City Morning Star (*Reducing Harmful Mercury*, July 1, 2005) exemplifies an ill-informed and potentially dangerous advocacy about mercury, fish and human health.

Most of the scientific literature across disciplines gives little to no credence to her hypothesis of harm from micro-trace mercury in fish, as it conflicts with an overwhelming body of modern research on past and present mercury in the environment. (Please refer to our library of mercury papers at: www.scienceandpolicy.org). The Senator repeats assertions derived from other sources which are the outcome of rejecting or ignoring contradictory studies and then taking flawed assumptions to their logical conclusion, a form of *reductio ad absurdum* in which the final absurdity is taken not as evidence of false premises, but as fact.

Ironically, such science-challenged assertions of alarming, *hypothetical* threats not only exploit the citizens of Maine and the nation, but likely are causing *real* harm to their mental and physical health, especially that of women, children and the elderly. In other words, those claiming to protect women and their children from "mercury poisoning" are the one's who, knowingly or not, are likely causing the only *real* harm by scaring people away from essential nutrition gained from a diet ample in fish. In a sternly worded letter dated March 14, 1996, former Maine Senator Cohen, along with Senator John Kerry and others, warned EPA about the potential for this negative outcome resulting from use of data of questionable quality and completeness. EPA ignored them.

Before examining some specifics of Senator Collins' assertions, let's provide some essential facts for context.

- Mercury (Hg) is an element that has existed (and will continue to exist) *naturally* since the earth was formed 4.5 billion years ago. The oceans alone contain millions of tons of mercury.
- The largest contribution of annual *air-borne* Hg is from *natural* sources such as volcanoes, forest fires, and oceans. Emissions from Yellowstone National Park, for example, likely exceed that of all Wyoming's coal-fired power plants combined.
- Under current estimates of total annual air-borne sources of Hg into the world cycle, US power plant emissions account for as little as 0.5%.
- When estimates of *all natural sources* are considered, including geothermal events *under* oceans and lakes, *US power plants may account for as little as 0.002% of the entire annual world mercury emissions budget.*

- Micro-traces of the potentially toxic form of mercury, methylmercury (MeHg), have likely been in fish tissue naturally since fish have existed. Studies examining mercury fish tissue levels in samples from the Atlantic and Pacific Oceans dating as far back as the 1880s have found no trends of increase relative to current levels.
- As for human exposure, there is ample evidence of “high” levels of mercury (Hg and MeHg) present in humans as long ago as 400AD. For example, eight 560-year old mummies from Alaska (dated to 1445 AD) had mercury levels *twice as high* as pregnant women in Alaska today.

So, let’s examine a few specific claims made by Senator Collins.

“Mercury is a potent neuro-toxin...” This is an incomplete statement that easily misleads into fear. Like almost any substance, including drinking water, mercury’s *potential* for toxicity depends on dose; how much one takes, over a time interval.

The U.S. Environmental Protection Agency’s (USEPA or EPA) dose level of concern is called a reference dose (RfD). This is the amount of a substance one can consume *every day, over a life time* of 70 years *without* fear of harm. For MeHg, it is based on the *worst case scenario* of low level exposure that leads to a blood concentration of 58 parts per billion (ppb), and then dividing that number by an extremely conservative factor of 10 as an “uncertainty” or safety factor.

Thus, EPA’s mercury RfD is 5.8 ppb when measured in human blood, and about 1.2 parts per million (ppm) when measured in human hair. EPA’s mercury RfD seems arbitrary, and is the most restrictive in the world. It is based on inappropriate studies of people inhabiting the Faroese Islands who consume *whale meat and blubber* (a unique diet no one in the US has) containing multiple chemicals (PCBs, cadmium, pesticides, persistent organic pollutants, DDT, etc.) of which mercury is only one. (And even here, the subtle effects described at low MeHg doses do not constitute developmental disabilities.) The owners of the Faroese raw data from this study refuse to release it for scientific review and replication.

The USEPA chose not to utilize the results of the Seychelles Islands study where no adverse effects were found in children of mothers who routinely consumed 10-14 fish meals per week and had a median methylmercury hair concentration of 6.6 ppm (equals approximately 26 ppb in blood). In the 66-month evaluation of the Seychelles cohort, *positive* neurodevelopmental outcomes were associated with increased prenatal and postnatal mercury exposure. This is one of the reasons why scientists, medical, and public health professionals *do not* agree on safe levels of dietary intake of methylmercury to protect the developing fetus.

“When mercury enters the environment, it takes on a highly toxic organic form known as methylmercury.” Considering the facts above, this statement is also scientifically incomplete and misleading. Mercury *is and always has* been part of the natural land and marine environments, and it is estimated that only a small fraction (about one one-thousandth) of the Hg that ends up in waterways *may* be changed into MeHg, which is

the kind of mercury with which EPA is concerned. This type of mercury can be eaten by tiny organisms that are then eaten by small fish, resulting in possible bioaccumulation in larger fish eaten by humans.

However, methylmercury is *not* emitted directly from fossil-fuel-fired power plants. It is produced and accumulated within the biosphere by a myriad of mercury transformation processes that *do not* depend upon the amount of Hg emitted from man-made sources. The natural cyclical *production and destruction* of MeHg is controlled by complex environmental factors and ecosystem processes that are presently beyond sufficient human understanding, let alone human control or intervention. A belief that one can significantly remove mercury, say from oceans or fish, is as illogical as believing one can remove all the salt from world oceans.

Again, as seen above, this cycling process and the natural presence of micro-trace mercury in marine life and humans who consume it has apparently been *safely* ongoing since both evolved.

“An estimated 600,000-plus American children are born each year with unsafe levels of mercury in their blood.” Variations of this claim are repeated by almost every mercury advocacy group. It is a *complete fiction* derived from an unofficial and inappropriate statistical extrapolation by a single EPA employee, from now outdated data (NHANES 1999-2000 survey). It is the primary claim undergirding Senator Collins’ advocacy on mercury.

Therefore, Senator Collins needs to be challenged to produce a single peer-reviewed science paper stating and justifying this claim. She also needs to be asked, if she stands by the only basis of this erroneous statement (the 1999-2000 NHANES report showing 7.8% of the 1709 women surveyed had mercury blood levels exceeding 5.8 ppb), why does she not, in the interest of honesty, adjust her claim downward to 300,000-plus since the basis numbers have now fallen in half (of 1928 women in the 2001-2000 survey only 3.9% tested above the RfD)?

The truth of the matter is that these on-going women’s health surveys by the Center for Disease Control (NHANES) show not a single woman or child has MeHg levels exceeding EPA’s Benchmark Dose Level (BMDL) of 58 ppb. Not a single one has mercury levels even approaching people living over 1,600 years ago. The most recently reported data (2001-2002) show that even the 3.8 percent of women exceeding EPA’s extreme RfD of 5.8 ppb still had a safety cushion of more than 800%. Keep in mind, not a single case of mercury toxicity from fish consumption has been suspected below 216 ppb.

And this only touches the surface of the problems with this claim. Basing costly public policy decisions on it could reasonably be seen as irresponsible.

Finally, the mercury scare is essentially a claim of industrial crime (“poisoning our children”) without any victims. Senator Collins needs to be asked, “Where are all the

victims of eating fish with micro-traces of MeHg?” Logically, if the alarmism were real, then according to alarmist claims and standards, every high fish consuming culture on the planet should be broadly populated with brain-damaged victims suffering severe and permanent learning deficits.

The opposite is the case. In Japan, 87% of the population exceeds the EPA RfD. In Hong Kong, Chinese children have mean mercury hair levels of 2.2 ppm (EPA RfD is 1.2). These children, like those of every high fish consuming nation, seriously outperform US children (mean mercury levels of only 0.12 ppm) from grades 4 -12 on international standardized tests for math and science. One key reason is because they eat lots of fish!

This is not surprising considering study after study shows no adverse effects on children from maternal fish consumption as high as 12-14 meals per week. Only benefits have been reported, such as superior eyesight, higher child mental development scores, less hyperactivity, good heart and brain function and improved intelligence at 4 years of age.

The real danger to human health and life is advocacy alarmism. Alarmism of the type in which Senator Collins appears complicit poses the risk of frightening people away from eating fish altogether, or in sufficient quantities to gain the essential nutritional benefits (recall former Senator Cohen’s warning to EPA). Already, Americans consume far less seafood than recommended amounts. The most seriously impacted groups include women (particularly pregnant women), fetuses, young children, black males (higher incidents of prostate cancer), the elderly and native subsistence populations.

Specific claims of concern for fetal and child health by EPA and mercury activists appear disingenuous because they largely fail to emphasize to the public the *benefits* of fish consumption. This activism could unnecessarily terrorize expectant mothers into not eating a food that promotes better fetal development and child health.

Premature birth is a striking and tragic example. So serious is this outcome that the March of Dimes organization has adopted it as a primary cause. More than 470,000 babies are born prematurely every year in the U.S. These infants aren’t just small; they’re developmentally “unfinished.” These are, unlike Senator Collins numbers, *real* numbers of heart-breaking harm.

More generally, regular fish consumption may help reduce risks for:

- (a) Cardiovascular disease + coronary heart disease (CHD) + sudden deaths
- (b) Breast cancer
- (c) Prostate cancer
- (d) Endometrial (inner lining of uterus) cancer
- (e) Kidney disorders
- (f) Alzheimer disease
- (g) Rheumatoid arthritis
- (h) Type 2 diabetes in women] and CHD in type 2 diabetic women

- (i) Pre-term delivery and low birth weights and mental development of infants and children
- (j) Postpartum depression and suicidal ideation
- (k) Stroke in men and women
- (l) High blood pressure
- (m) Poor adult cognitive performance
- (n) Hostility in young adults (18-30 years)
- (o) Bipolar disorders

In conclusion, Senator Collins could benefit from a broadening of her exposure to the scientific literature. Public health policy should first “do no harm.” Clearly, the literature evidences that scientifically weak and distorted advocacy campaigns of mercury alarmism, regardless of motive, are an irresponsible endangerment to public health, both in Maine and the nation.

Robert Ferguson
Center for Science and Public Policy
Washington, DC
202-454-5249
www.scienceandpolicy.org