

DEBATE

Persistent organic pollutants in food supplies

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Persistent organic pollutants (POPs) in various food supplies have important health impacts, but are not as devastating as malnutrition and, perhaps, obesity. POPs should be controlled and the Stockholm Convention is having an accelerating effect on the global decline of POP manufacture and use. Reservoirs from previous misuses are much larger than current manufacture and efforts should be directed at containing these reservoirs, tackling food shortages, and continuing to educate toward following advisories and maintaining a varied diet and food sources.

The presence of anthropogenic toxicants in food is not a new issue. In the early 1950s, my interest in toxicology was sparked by an article in *Life* magazine entitled "Poison on your table", mostly dealing with chemical preservatives. I still have an article an uncle saved from a *Police Gazette* from the same era entitled "Cancer in your beef" referring to "stilbesterol". Persistent organic pollutants (POPs) in food have merely become more widely acknowledged as a health concern.

Malnutrition and, ironically, obesity are dietary issues of probable greater current global health impact than trace POPs in food. Extreme malnutrition has the most immediately obvious and dramatic manifestations. Nevertheless, all three factors have subtle and insidious health impacts including immune, neurological, and endocrine consequences that directly and indirectly affect the quality of life on a global scale. The endocrine effects of POPs can exacerbate nutritional deficiencies. Costs in productivity and medical care are staggering. Individual deviations from optimal development and minimal wellbeing affect localised stability and attitudes, which in turn are detrimental to global social, political, and economic stability. For malnutrition and POPs, social and political repercussions from gross environmental and nutritional inequalities within the context of still exploding populations lead to frantic attempts at corrections. Desperate reactions by populations whose capacities are diminished by compromised health and, perhaps, failure to reach full intellectual potential may lead to more damaging short sighted solutions such as illegal agricultural use of POP pesticides.

All of these connections must be considered simultaneously, even when tackling a single aspect systematically. Schafer and Kegley¹ have evaluated POPs in the US food supply in a manner as thorough and methodical as possible from their database—the Food and Drug Administration (FDA) Market Basket Survey supplemented

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by the United States Department of Agriculture (USDA) Pesticide Data Program. Fish and milk are known to contain POPs, but there were a few surprises in that some of the other most nutritional and economical foods (for example, carrots and squash) contain high levels and/or broad spectra of POPs. This occurred even though the data were incomplete for polychlorinated dibenzo-p-dioxins such as TCDD, and non-existent for polychlorinated biphenyls (PCBs) and polychlorinated dibenzofurans.

Worse case scenarios (eating meals consisting of all foods at the FDA tolerance levels) could achieve a daily intake exceeding minimum risk levels for dieldrin by 50%–60% and much greater excesses of DDT. In fact, a single fish containing the 5 ppm DDT limit would cause an adult to exceed minimum risk levels (MRLs) by 50-fold and a child by 180-fold. Of course not every food item contains detectable POP levels, let alone FDA action levels. MRLs are estimated from total exposure over time, most fish have much lower DDT burdens, and fish advisories are issued at fractions of the FDA action levels. The fact that extremely unlikely cases may result in excessive exposures does not argue for lowering the action levels, but rather for varying one's diet. Varying the sources of foods and the diet becomes even more important when the multiple sources of multiple toxicants, which may be additive or greater, are considered. Some action levels *may* be too high, but lowering all would have two unfortunate consequences. Removing food from the market because of "hits" on lower action levels would further strain the supply; this would be of small consequence in most parts of many developed countries, but would eventually affect supplies where they are already marginal. (This, of course, does not imply that POP contaminated foods be used to meet shortages.) More importantly, very low action levels and numerous publicised recalls would instill a false sense of security in the food supply; the effort spent educating the public to vary their diets and sources and limit intake of certain healthful, but high POP, foods such as some fish would be more often ignored.

Although the Stockholm Convention should be implemented, expectations might be too high and lead to eventual abandonment. The worldwide production of POPs is now lower than the reservoirs of past production and misuse. Pesticides are more necessary in countries with marginal food supplies than in the US. Between 1997 and 1999, 2.2 millions pounds of POP pesticides were exported from the US (out of 3200

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Abbreviations: POPs, persistent organic pollutants; MRLs, minimum risk levels; PCBs, polychlorinated biphenyls

million pounds of pesticides); these exports ceased in 2000,² around the time that the Stockholm Convention was finalised. There are many non-point sources of pesticides and PCBs including the atmosphere as evidenced by deposition on, especially urban, windows.³ Surface waters, including the oceans, contain large reservoirs continually exchanging with the atmosphere.⁴ Many wastewaters are cleared of POPs, but the digestion process exchanges them to sewage sludges that represent another large reservoir.⁵ The most PCB contaminated local areas today are probably the Michalovce district in Eastern Slovakia⁶ and an area of Anniston, Alabama, USA.⁷ Other "left over" hot spots (after production is discontinued) may be found near the manufacturing facility, albeit on a smaller scale. For example, DDT and metabolite residues were all well above 1 ppm in river sediments near a former production facility in Pakistan.⁸ Environmental and human burdens of POPs generally declined between the 1970s and 1990s,^{9, 10} but the decline has slowed; therefore, any expectations of significant further declines through implementation of the POPs treaty may not be realised for decades.

While ratification of the POPs Treaty may accelerate the phase out of POP release and benefits could be realised in future generations, the process is already underway. Precious effort and resources should not be squandered to pressure bureaucrats only to validate a treaty whose very existence is having a positive impact. Resources could be wisely devoted to education, containing reservoirs, remediation, and nutritional

issues. The article by Schafer and Kegley¹ is also a useful contribution to the important educational dimensions of the debate.

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