



# Health Risks and Environmental Issues

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## Dioxin: A Universal Toxin – Part 1

In issues #210 and #211 of the *Townsend Letter* this column dealt with some of the health and environmental

risk factors associated with plastics. A discussion about the hazards of plastics would be incomplete without a follow-up discussion of dioxins.

Because plastic is relatively inexpensive to manufacture, more products are now being made out of plastic including children's toys, food containers, floor coverings, furnishings, auto parts, and thousands more items. Plastic is everywhere in the modern world.

Unfortunately, plastic products do not have a long survival rate. They are designed to last five to ten years and then be replaced by newer plastic products. Even more wasteful, many plastic items are designed to be used only once and discarded, like plastic shavers, cigarette lighters, utensils, etc.<sup>1</sup>

All this plastic junk has to go somewhere. Some plastic items can be recycled. The rest becomes garbage thrown into landfills or burned in incinerators. During the incineration process plastic and chlorine bleached paper products undergo changes that produce a seriously toxic class of chemicals known as dioxins.

So potent are these chemicals that they are referred to as the *Darth Vader* of toxic chemicals by epidemiologist Richard Clapp of Boston University's School of Public Health.<sup>2</sup>

### All in the Family

Dioxins represent a family of 75 toxic chemicals, none of which occur naturally, nor have they been intentionally produced for any useful purpose. Dioxins are byproducts of the modern industrial age. They are created in the manufacture of certain pesticides and herbicides (2,4,5-T), wood preservatives made from trichlorophenols and some germicides (hexachlorophene).<sup>3</sup>

Dioxins are closely related to the polychlorinated dibenzofurans (furans), and to the polychlorinated biphenols (PCBs) which number 209. Used primarily as insulators, PCBs were banned in 1977, but the chemicals persist in many products, landfills, and hazardous waste sites. When PCBs are burned furans are produced. Furans are considered to be more toxic than the original PCBs.<sup>4</sup>

Additional sources of dioxin are the manufacture of chlorine bleached paper, the combustion of wood in the presence of chlorine, burning chlorinated benzenes and biphenols (PCBs), automobile exhaust burning leaded fuel, solid waste incineration, cement kilns, metal smelting, and chemical production.<sup>5,6</sup>

Another member of the dioxin family is polychlorinated dibenzo-p-dioxins, an unwanted byproduct of incineration. Dioxins are produced when the widely used plastic polyvinyl chloride (PVC) is burned. Even backyard burn barrels can be

exceedingly dangerous when plastic items are tossed in with the garbage. Medical waste incinerators are another source of unwanted dioxin.<sup>7</sup> The term dioxin is often used to refer to the class of related chemicals.

### PVC and Dioxin

The polyvinyl chloride (PVC) industry is the largest user of chlorine, which creates unique dangers avoided by other plastic manufacturing, and it is a major source of dioxin. Dioxins are an unintended consequence of PVC production.<sup>8</sup>

The compound dangers of PVC are that it first produces dioxins in the manufacturing process, and again when it is incinerated. Furthermore, PVC is the least recyclable of all plastics.<sup>9</sup>

Dioxins, considered by many scientists to be among the worst toxins on the planet, are everywhere. These unintended and invisible byproducts of incineration are carried around the globe by air currents, eventually settling down on land and water polluting the entire planet.

Industrial solid waste facilities, even backyard burn barrels into which polyvinyl chloride (PVC) products have been thrown, all produce dioxin.<sup>10</sup> Medical waste incineration is a major source of toxic air emissions of dioxin and cadmium, a point not lost on proponents of a holistic health paradigm.<sup>11</sup>

Additional sources of dioxins come from discharges into rivers from pulp mills that utilize a chlorine bleaching process on their paper, and from unknown quantities of hidden toxins buried in old chemical dumps around the country.<sup>12</sup>

Cement and cement kiln dust contain dioxins and furans. As a cost cutting measure some cement kilns burn hazardous waste as a fuel. The US EPA found the most potent poison of the dioxin family, molecule 2,3,7,8-TCDD to be present in samples from kilns burning hazardous waste. Other dioxins were found in samples from kilns not burning hazardous waste.<sup>13</sup>

In addition to the 1,329 US and Canadian municipal, medical and hazardous waste incinerators, approximately 700,000 structural fires occur each year, adding more dioxin to the atmosphere from the burning of PVC furnishing and construction materials including wiring, flooring, siding, etc.<sup>14</sup>

### A Global Menace

Dioxin is now a global health threat because it is persistent in the environment and because it is capable of traveling long distances. High levels of dioxin have been found near PVC manufacturing facilities and around solid waste incinerators in the US, Germany, and Japan.<sup>15</sup>

Quite often these polluting industries – manufacturing plants and incinerators – are located in economically deprived communities where jobs are badly needed. In 1949 workers were exposed to dioxin during an accident at a Monsanto plant in

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Nitro, Virginia. In 1953 an accident at a BASF plant in West Germany released dioxin into two neighboring communities.<sup>10</sup>

Agent Orange was extensively sprayed in Southeast Asia during the Vietnam War between 1962 and 1970. Agent Orange, a defoliant and weed killer, got its name from the orange stripe on the 55-gallon storage containers. It was a 50-50 mixture of two herbicides, 2,4,5-T and 2,4-D.<sup>17</sup>

Evidence that 2,4,5-T could cause birth defects in humans caused it to be banned in this country in 1980, after it had been sprayed on forests in the Pacific Northwest resulting in an alarming increase of miscarriages. The other half of Agent Orange, 2,4-D, is widely used throughout the US for killing dandelions and other broadleaf plants in lawns, and as an agricultural weed killer.<sup>18</sup>

In 1968 approximately 1,800 people in Yushko, Japan consumed rice contaminated with PCBs and dibenzofurans.<sup>19</sup>

In 1971 waste oil laced with dioxin was spread on roads in the town of Times Beach, Michigan, to contain dust. In 1983 the town had to be evacuated after flood water spread the contaminant throughout the entire community. The government tried to downplay the disaster that killed horses and poisoned people.<sup>20</sup>

In 1976 a Hoffman La Roche trichlorophenol plant exploded in Seveso, Italy, exposing 37,000 people to a toxic cloud of chemicals containing dioxin. The area was divided into three zones to evaluate health risks. Inhabitants closest to the explosion were evacuated. The second zone, whose inhabitants were not evacuated have seen the greatest increase in cancers of the gall bladder, biliary tract, and blood-forming system (multiple myeloma and myeloid leukemia) among women.<sup>21</sup>

The male population in this zone saw an increase of cancers of the blood-forming system, and in one kind of non-Hodgkin's lymphoma (lymphoreticulosarcoma). This study covered a brief span of ten years following the explosion. Many cancers take twenty or more years to develop.<sup>22</sup>

In 1978 dioxin was discovered buried at Love Canal, Niagara, New York. Two hundred and forty families were initially evacuated followed by 740 families two years later, an action taken only as a result of unrelenting demands by the affected parties. Local and state regulatory agencies initially denied that 21,000 tons of buried waste by Occidental Petroleum's Hooker Chemical Company could be responsible for the many miscarriages, birth defects, and other health problems at Love Canal.<sup>23</sup>

Hooker Chemical and Occidental Petroleum knew the buried chemicals were toxic to humans. After Hooker filled in the dry canal bed and sold the land to the school board for \$1.00, they stipulated in the deed "that if anyone was harmed by the buried waste, Hooker and Occidental would not be responsible."<sup>24</sup>

Currently activists are fighting a hazardous waste incinerator at Kodak Park in Rochester, New York, and pushing for General Electric Corporation to clean up PCBs it dumped into the Hudson River at several locations between Albany and New York City.

### Fraudulent Studies

The major players in dioxin production are Monsanto, BASF, and Dow Chemical. All three companies manufacture commercial products contaminated with dioxin, and conducted health studies indicating there is no danger to human health.<sup>25</sup>

Industry scientists have consistently claimed there is no evidence linking dioxin to cancer in humans, relying heavily on studies by Monsanto and BASF of West Germany. EPA scientists have found falsified data in the Monsanto study that EPA relied

on for setting its own health standards for dioxin exposure. BASF manipulated data relating to the number of cancers in workers exposed to dioxin in an industrial accident that occurred in 1953.<sup>26</sup>

Considering the many sources that add dioxin to the environment, it is imperative that the US Environmental Protection Agency (EPA) rely on accurate responsible information from good scientific research in order to properly assess the dangers when setting allowable levels for human exposure.<sup>27</sup>

### EPA Reviews Dioxin

The 1994 EPA assessment warned of dioxin's carcinogenic capabilities. With a lot at stake and not believing it could be that dangerous, the chlorine and paper industry insisted that EPA take a second look at the research. A very strange thing happened. EPA's reassessment of dioxin "showed it to be ten times more toxic."<sup>28</sup>

In addition to learning of its expanded carcinogenic capabilities, EPA scientists reported "disturbing new evidence of developmental and reproductive effects in children,... particularly developing infants (who) are highly sensitive and vulnerable to the toxic effects of dioxins."<sup>29</sup>

By some estimates, the 2,3,7,8-TCDD form of dioxin is considered to be 470,000 times more potent than DDT. One EPA expert has even compared the chronic toxicity of dioxin to that of plutonium!<sup>30</sup>

### Dioxin in Food

As part of their ongoing dioxin reassessment the EPA began looking for dioxin in food in the early 1990s. At that time EPA reports indicated that approximately 95% of human exposure to dioxin comes primarily from eating red meat, fish and dairy products (milk, cream, cheese, ice cream). These studies prompted more government studies of dioxin in meat, fish, pork and chicken.<sup>31</sup>

In September 1996, EPA researchers found elevated levels of dioxin (3.9 and 3.2 parts per billion p/p/b) in composite samples of chicken. In 1997 more evidence of dioxin contamination was found in chickens, eggs, and farm-raised catfish. On July 13, a ban was put into effect involving as many as 350 chicken and egg producers, mostly from Arkansas and Texas. The required levels of dioxin in these foods was set to be less than one part per trillion.<sup>32</sup> Successful lobbying by the Mississippi Congressional delegation got the catfish industry off the hook (pun intended), and they were excluded from the ban.

The source of contamination in the chickens, eggs, and catfish was traced to a soy-based feed product, to which dioxin-contaminated clay (bentonite, or ball clay) was added to prevent clumping and improve flow. Bentonite is the main ingredient in kitty litter.

Prior to this, the US government did not have any standards regarding the amount of dioxins found in food. The Federal Drug Administration (FDA) responded by setting the one-part-per-trillion as a "level of concern" for this single instance of dioxin contamination of animal feed. In spite of their responsibility to protect the American public, the FDA yielded to political pressure and overlooked the most contaminated food. Farm-raised catfish filets were found to contain levels of dioxins ranging from 10.2 to 27.8 p/p/t.<sup>33</sup>



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According to FDA spokesperson the ban in no way indicated a health threat from eating these foods, and was more akin to "turning off the faucet," to this "avoidable contamination."<sup>34</sup>

The EPA estimated that one cancer in a million persons can be expected to occur with a daily intake of 0.01 picograms of dioxin per kilogram of body weight per day for a lifetime. (A picogram is a trillionth of a gram a trillion is a million million.)<sup>35</sup>

GREENPEACE chemist Pat Costner, interpreted the formula to mean that a 154 lb. person who consumed 43 meals of 5 oz. servings of food contaminated with 3 p/p/t of dioxin would exceed EPA's recommended lifetime dose of dioxin from those 43 meals alone. Many people consume 43 meals of dioxin-containing foods in less than two weeks! Add to this a lifetime diet of red meat, milk, cheese, ice cream, chicken, pork, eggs, and fish laced with dioxin, and it becomes evident why degenerative diseases are so prevalent in our culture.<sup>36</sup>

Government knows more than it's telling. As early as 1992 EPA indicated the average American routinely takes in between 300 and 600 times the "acceptable" levels of dioxins each day from food and water, while the FDA has volumes of research showing that dioxin is harmful to humans and wildlife at exceedingly low levels.<sup>37</sup>

Dioxins, like many other toxic chemicals, accumulate in fat and move up the food chain where humans can harbor the highest amounts. Dioxin particles settle on grazing land and are ingested by cows and meat animals where the toxins concentrate in tissue fat and dairy products.<sup>38</sup>

Dioxin in milk is compounded by the dioxin in the chlorine-bleached dairy cartons.<sup>39</sup> Plastic milk containers cause other problems by contributing more plastic to the waste stream and incineration, thereby adding more dioxin to the environment. Some retailers sell milk in glass bottles. If more consumers ask for it, more retailers will oblige.

Because dioxin is stored in fat, people with more body fat will store more dioxin. Dioxin stored in fat will be eliminated more slowly from the body.<sup>40</sup>

Breast milk is rich in fat and carries considerable quantities of dioxin in that fat. Nursing speeds up elimination of dioxin from the mother, but increases the amount received by the baby. All in all, nursing is still recommended. However, women who live near a known source of pollution may want to consider all their options.<sup>41</sup>

Women who have been long term vegetarians avoiding dairy products, carry a lower burden of dioxin in their bodies and in their breast milk. Vegetarians will be happy to note that dioxins are not taken up by the root systems of plants, but the toxins can settle anywhere, even on organic farm produce.<sup>42</sup> It is a good practice to wash all fruits and vegetables thoroughly.

Dioxin gets into rivers, streams, lakes and oceans, where it settles on bottom sediment and is eaten by shellfish or other small marine creatures that are, eaten by larger fish. Dioxin builds up in their fat or organs. Fattier fish harbor more dioxin.<sup>43</sup>

Pregnant women in Maine are advised not to eat the green stuff in lobsters because it is high in dioxin. The green stuff is a combined liver and pancreas, or hepatopancreas, and is commonly referred to as the "tomalley."<sup>44</sup>

Dioxin chemicals are insidious poisons stealthily hiding from our senses. In general we cannot see, smell, taste, hear or feel them. Although the amount of dioxin being produced is declining slightly, we are all ingesting dangerous amounts in the food

supply, particularly via high fat foods such as meat and dairy. It's invisible; it's tasteless; and it is in all of us.<sup>45</sup>

## Reducing Dioxin in the Diet

The simplest way to avoid dioxins would be to avoid all animal and all dairy products, all fatty fish and bottom feeders. So what's left to eat? Whole grains, fresh fruits and vegetables, preferably organic and thoroughly washed, provide the safest and healthiest diet.

The average American is not likely to make drastic changes in their eating habits, but even moderate changes would be helpful. Eating less red meat - smaller portions of the leanest cuts would be helpful. Reducing daily consumption and buying only low fat products would be beneficial since dioxin accumulates in fatty foods.

## References

1. Kunzig, Rbt., Chemistry of Plastics, *Discover Mgz.*, Dec 2000.
2. Liebman, Bonnie, Dioxin for Dinner?, *Nutrition Action Newsletter*, Oct. 2000.
3. Montague, Peter, PhD, Dioxin Part 2; Gauging the Toxicity of Dioxin, *Rachel's Hazardous Waste News*, #173, March 21, 1990.
4. Liebman, Bonnie, Dioxin for Dinner, *Nutrition Action Newsletter*, Oct. 2000.
5. Montague, Peter, PhD, Dioxin Part 2; Gauging the Toxicity of Dioxin, *Rachel's Hazardous Waste News*, #173, March 21, 1990.
6. Montague, Peter, PhD, Dioxin Precution, *Rachel's Environmental and Health Weekly*, #653, June 3, 1999.
7. Burlingham, Gilly, It's in the Air: The Most Dangerous Stuff Ever, *Sierra Atlantic Mgz.*, Fall 2000.
8. Cray, Charlie, & Harden, Monique, PVC & Dioxin: Enough Is Enough, *Rachel's Environmental Health Weekly*, #614 Sept. 17, 1998.
9. *Ibid.*
10. Burlingham, Gilly, It's in the Air: The Most Dangerous Stuff Ever, *Sierra Atlantic Mgz.*, Fall 2000.
11. Montague, Peter, PhD, Medical Incinerators Emit Dangerous Metals and Dioxin, *New Study Says Rachel's Hazardous Waste News*, #179, May 2, 2000.
12. Winter, Ruth, *Poisons In Your Food*. Crown Pub. Inc., 1991, NY.
13. Montague, Peter PhD, Cement and Kiln Dust Contain Dioxins, *Rachel's Hazardous Waste News*, #314, Dec. 2, 1992.
14. Gibbs, Lois Marie, *Dying from Dioxin*, South End Press, 1995, pp. 44,61, Boston, MA.
15. Cray, Charlie & Harden, Monique, PVC & Dioxin: Enough Is Enough, *Rachel's Environmental Health Weekly*, #616 Sept. 17, 1998.
16. Gibbs, Lois Marie, *Dying From Dioxin*, South End Press, 1995, p. xxix, Boston, MA.
17. Montague, Peter, PhD, The Dogs of War, *Rachel's Environmental & Health Weekly*, #496, April 6, 1995.
18. *Ibid.*
19. Gibbs, Lois Marie, *Dying from Dioxin*, South End Press, 1995, p. xxix, Boston, MA.
20. Burlingham, Gilly, It's in the Air: The Most Dangerous Stuff Ever *Sierra Atlantic Mgz.*, Fall 2000.
21. Montague, Peter, PhD, EPA: Dioxin Causes Cancer in Humans, *Rachel's Hazardous News Weekly* #353, Sept., 2, 1993.
22. *Ibid.*
23. Gibbs, Lois Marie, *Dying from Dioxin*, South End Press, 1995, p.64, Boston, MA.
24. Gibbs, Lois Marie, *Dying from Dioxin*, South End Press, 1995, p.xvii, Boston, MA.
25. Gibbs, Lois Marie, *Dying from Dioxin*, South End Press, 1995, p.2, Boston, MA.
26. Montague, Peter, Ph.D., Dioxin - Part 1; Dioxins and Cancer: Fraudulent Studies, *Rachel's Hazardous Waste News*, #171, March 7, 1990.
27. *Ibid.*
28. Burlingham, Gilly, It's in the Air: The Most Dangerous Stuff Ever, *Sierra Atlantic Mgz.*, Fall 2000.
29. Lester, Stephen, EPA's Latest Assessment of Dioxin: More Toxic Than Ever, *Everyone's Backyard*, Vol. 18, No. 3, CHEJ, Fall 2000.
30. Stienman, David, *Diet for a Poisoned Planet*, Harmony Books, 1990, NY.
31. Montague, Peter, PhD, Dioxin in Chickens and Eggs, *Rachel's Environmental Health Weekly*, #555, July 17, 1997.
32. *Ibid.*
33. *Ibid.*
34. *Ibid.*
35. *Ibid.*
36. *Ibid.*
37. *Ibid.*
38. Liebman, Bonnie, Dioxin for Dinner?, *Nutrition Action Newsletter*, Oct. 2000.
39. Stienman, David, *Diet for a Poisoned Planet*, Harmony Books, 1990, NY.
40. Gibbs, Lois Marie, *Dying from Dioxin*, South End Press, 1995, p.65, Boston, MA.
41. Gibbs, Lois Marie, *Dying from Dioxin*, South End Press, 1995, p.66, Boston, MA.
42. Gibbs, Lois Marie, *Dying from Dioxin*, South End Press, 1995, p.46, Boston, MA.
43. Liebman, Bonnie, Dioxin for Dinner?, *Nutrition Action Newsletter*, Oct. 2000.
44. *Ibid.*
45. Burlingham, Gilly, It's in the Air: The Most Dangerous Stuff Ever, *Sierra Atlantic Mgz.*, Fall 2000.