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# Triclosan: What the Research Shows, 2008-2010

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Although the market for "antibacterial" products remains strong, public opinion on triclosan is turning. In the past two years, pressure from activists and U.S. policy makers, as well as emerging science have forced federal agencies to finally begin a thorough investigation of this toxic pesticide.

U.S. consumers spend an estimated $1 billion per year on "antibacterial" soaps and other household and personal care products, many of which contain triclosan.[1] It is estimated that 76 percent of liquid soaps and 29 percent of bar soaps on the market contain triclosan or triclocarban, another commonly used antibacterial chemical.[2]

Yet research published between 2008 and 2010 demonstrates the many ways triclosan negatively impacts public and environmental health. The sheer number of new studies on triclosan published over the past two years punctuates this growing concern. The manufacturers of "antibacterial" products that use triclosan, may soon find that they have no choice but to remove this chemical from their formulations.

In particular, the most recent literature highlights triclosan's considerable human and environmental health effects. What is emerging is a clearer picture of the effects of triclosan on the individual and the food chain.

## Health Concerns

### *Continuous Human Exposure*

Early research identified triclosan's tendency to accumulate in our bodies. Triclosan has been found in human blood and urine, as well as in breast milk and umbilical cord blood.[3,4,5] In 2008, the Centers for Disease Control's National Health and Nutrition Examination Survey (NHANES) report found triclosan in the urine of 75 percent of the U.S. population.[6]

New data suggest that the amount of triclosan in our bodies is higher than ever. The Centers for Disease Control's 2010 publication, the *Fourth National Report on Human Exposure to Environmental Chemicals,* estimates that human triclosan levels increased by more than 41 percent between 2004 and 2006.[7] In addition, the report suggests that triclosan concentrations increase with age.

While triclosan is nearly ubiquitous in the human population, including in people who avoid antibacterial products, some people may be more affected than others. In 2009, Physicians for Social Responsibility, the American Nurses Association and Health Care Without Harm jointly released a report on toxic chemicals found in the bodies of doctors and nurses. The *Hazardous Chemicals In Health Care* study tested for 62 chemicals, including triclosan. Of the 20 participants, 75 percent had triclosan in their urine; these findings were consistent with the 2003-2004 NHANES study. However, the average study participant had three times more triclosan in their urine than was detected in the general U.S. population.[8]

Another study published in 2009 signals troubling news about triclosan's ability to bioaccumulate. Researchers at the National Oceanic and Atmospheric Administration (NOAA) discovered triclosan in the blood of wild bottlenose dolphins.[9] The study examined blood samples from wild bottlenose dolphins living in South Carolina and Florida waterways. Triclosan was detected in 31 percent of the dolphins tested from South Carolina and 23 percent of the animals from Florida. This is the first study to identify triclosan bioaccumulation in wild marine mammals.

### *Hormone Disruption*

Previous animal studies have shown that triclosan alters important hormone levels, which could result in neurotoxicity, decreased thyroid function and the growth of breast cancer cells.[10,11,12] According to a scientific statement issued by the Endocrine Society in 2009, hormone-disrupting chemicals can cause early onset puberty, reduced fertility, neurodevelopmental problems, obesity and cancer.[13]

In 2009, researchers discovered that exposure to triclosan substantially decreased levels of testosterone and thyroxine, an important thyroid hormone, in young male rats.[14] A 2010 study suggests that the decrease in thyroxine could be caused by triclosan's effect on the liver.[15] Additional research has shown that triclosan dramatically reduces sperm production in a variety of laboratory animals including male rats and adult male mosquitofish.[16,17]

Similarly, research shows that triclosan affects the levels of thyroid hormones and estrogen in female rats. Young female rats exposed to triclosan showed a decrease in total thyroxine levels. Specifically, triclosan exposure was associated with early onset advanced stages of puberty and an increase in uterine weight.[18]

### *Fetal Growth and Development*

An alarming new scientific finding links triclosan to potential negative birth outcomes. In late 2010, scientists at the University of Florida published their discovery that triclosan interferes with an enzyme that helps estrogen cross the placenta to reach the growing fetus.[19] Estrogen is vital for the growth and development of major organs, like the lungs and liver, in a growing fetus. Miscarriage can occur when estrogen is unable to cross the placenta.[20]

Making matters worse, new data published in January 2011 reveal high levels of triclosan in pregnant women. Using a nationally representative sample of the United States population from the NHANES 2003-2004 data, researchers found that while concentrations of chemicals in pregnant women were similar if not lower than in non-pregnant women, triclosan was one of few exceptions found to be more highly concentrated.[21]

> *"The high potency of Triclosan as an inhibitor of estrogen sulfotransferase activity raises concern about its possible effects on the ability of the placenta to supply estrogen to the fetus, and in turn on fetal growth and development" (James, 2010).*

### *Allergies*

New research from the University of Michigan reveals a potential link between triclosan and increased risk of allergies in children. Using 2003-2006 NHANES data, researchers compared allergy antibody levels, history of hay fever and allergy diagnoses to the level of triclosan present in urine samples. In the under-18 age group, children with higher concentrations of triclosan in their urine were also more likely to have been diagnosed with allergies or hay fever.[22]

## Environmental Concerns

As in the human population, triclosan is also pervasive in the environment.[23,24,25] Triclosan has made its way from the store, to our homes, down the drain, and into our water and wildlife. Previous research identified triclosan in drinking water, surface water, algae, fish and earthworms.[26,27,28,29] New data reveal an even more sobering picture of triclosan's impact on the environment, and the food chain.

> *". . . triclosan is found in finished drinking water, surface water, wastewater, and environmental sediments, as well as in the bile of wild fish, indicating extensive contamination of aquatic ecosystems."[30] (Fang, 2010)*

### *Toxicity*

Pesticides like triclosan are highly toxic to algae and other microorganisms.[31] A 2010 study tested the effects of triclosan on naturally occurring bacterial communities. The results indicate that even at low levels, triclosan can reduce photosynthesis in a type of algae known as diatoms.[32] It is through the process of photosynthesis that diatoms generate the oxygen and nourishment other aquatic life need to survive.[33]

Though triclosan may be more toxic to algae, it can affect higher forms of aquatic life. In 2010, Japanese researchers designed a study to determine the impact of triclosan on the eating and swimming habits of medaka fish. Although triclosan did not significantly impact eating behaviors, it did slow swimming speed.[34]

### *Persistence*

According to the U.S. Environmental Protection Agency's 2009 Targeted National Sewage Sludge Survey, triclosan was detected in 92 percent of sewage sludge samples collected from across the United States.[35] Of the chemicals used in personal care products, triclosan was the second most common contaminant; triclocarban was the most common contaminant. A 2010 study conducted by the U.S. Department of Agriculture confirms that triclosan in sewage sludge degrades slowly and persists in the environment at low levels.[36]

### *Food Chain*

It is estimated that more than 100,000 pounds of triclosan are spread on U.S. agricultural fields as sludge each year.[37] Until recently, scientists had speculated that triclosan could contaminate agricultural crops that had been "fertilized" with sludge. New research confirms that crops can readily absorb triclosan from sludge. Researchers simulated sludge application and recycled wastewater irrigation on soybean crops. They found that the root systems absorbed triclosan from both the sludge and wastewater. Moreover, triclosan migrated to other parts of the plant, including the beans.[38]

### *Breakdown Products*

Numerous studies have shown that when triclosan-contaminated surface waters are exposed to sunlight, triclosan can produce a suite of toxic byproducts.[39,40,41] In 2010, University of Minnesota scientists found that as concentrations of triclosan in sediment increased, so did the levels of four dioxins derived from triclosan. While levels of all other dioxins have dropped by 73 to 90 percent over the last 30 years, the levels of these four triclosan-associated dioxins have risen by 200-300 percent.[42] This is especially concerning given that dioxins are known carcinogens. The United Nation's Stockholm Convention includes dioxins in its list of the 12 most toxic chemicals, known as the *dirty dozen*.[43]

## Conclusion

Triclosan is everywhere. It is in our homes and in our bodies. And triclosan is just one of the hundreds of chemicals we come into contact with and absorb every day. The precise consequence of carrying around an individual chemical like triclosan is uncertain. But from what we have seen in peer-reviewed studies, triclosan has the potential to disrupt hormones, interfere with normal fetal development, increase risk for antibiotic-resistant superbugs and affect every segment of the food chain. Scarier still, we don't know the long-term effects of carrying around the mixture of chemicals present in our bodies.

One thing that is certain is that infants and children are exposed to triclosan before they even come into this world. It is unacceptable that they are subjected to potential harm when products containing triclosan are no more effective than products made without it. For every "antibacterial" product on the market, there is an equally effective and safer alternative. Triclosan is one chemical that could, and should, be eliminated from our shelves and our bodies.

## About Food & Water Watch

Food & Water Watch is a nonprofit consumer organization that works to ensure clean water and safe food in the United States and around the world. We challenge the corporate control and abuse of our food and water resources by empowering people to take action and by transforming the public consciousness about what we eat and drink.

## Endnotes


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