Are We Being Too Clean?

An assessment and mitigation of the effects of the antimicrobial agent triclosan

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Abstract

The antimicrobial agent triclosan is a common ingredient for a variety of manufactured goods ranging from cosmetics, soaps, to cutting boards and medical devices. It is found in a75 percent of antibacterial liquids soaps. Triclosan was first added to hospital surgical scrubs in the 1970s when its endocrine disruptor properties were seen in affect to bacterial cells. Since then, production of antibacterial products has raised concern after concentrations of triclosan were starting to show up in human blood and urine as well as in some United States waterways. Studies have shown a correlation between triclosan concentrations and the probability of humans having allergies, cancer, or antibiotic resistance. Other experiments have shown a decrease in muscle control in animals. Another concern is triclosan' s tendency, in certain aqueous conditions, to photo transform into harmful dioxins. In order to further assess these concerns, I interviewed University of Minnesota Civic Engineer William Arnold, College of Saint Benedict Professor of Chemistry Dr. Michael Ross, and Assistant Lab Manager of Saint Paul's Wastewater Treatment plant. Combined with some secondary research, I was able to conclude that additional consumer education and governmental intervention need to take place so that triclosan doesn't cause more harm than benefit.

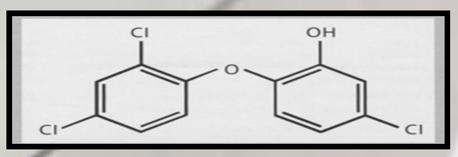


Image 1. The Chemical Structure of Triclosan

Methods

In order to address these concerns, I conducted research by analyzing scientific journals, reviewing governmental documents and regulations, and also through personal interviews. I personally interviewed Professor of Chemistry at the College of Saint Benedict Dr. Michael Ross, a kindergarten teacher at Brainerd Elementary Mrs. Ramey, and the Assistant Lab Manager of Saint Paul's Wastewater Treatment plant, Dave Fuchs. As well as a phone interview with University of Minnesota Civic Engineer William Arnold. Combined with secondary research by reviewing newspaper articles, web publications, and radio podcasts I was able to effectively assess how governmental regulations should be mitigated and should include consumer education so that triclosan doesn't become more of a harm than a benefit.

Table 1. Some products that contain the antimicrobial agent triclosan

Liquid Soaps	Cosmetics	Dental Care
Clearasil ® Daily Face Wash	Supre ® Café Bronzer™	Colgate Total Toothpaste®
Clean & Clear Foaming Facial Cleanser	Movate ® Skin Litening Cream HQ	Reach ® Antibacterial Toothbrush
Dial ®liquid soap	Garden Botanika ® Powder Foundation	Janina Diamond Whitening Toothpaste
Provon ® Soap	Movate ® Skin Litening Cream HQ	Janina Diamond Whitening Toothpaste
Palmolive ® Antibacterial Hand Soap	Revlon ColorStay Lip-SHINE Lipcolor Plus Gloss	Listerine Tartar Control Mouthwash

Image 3

Image 4

Image 5

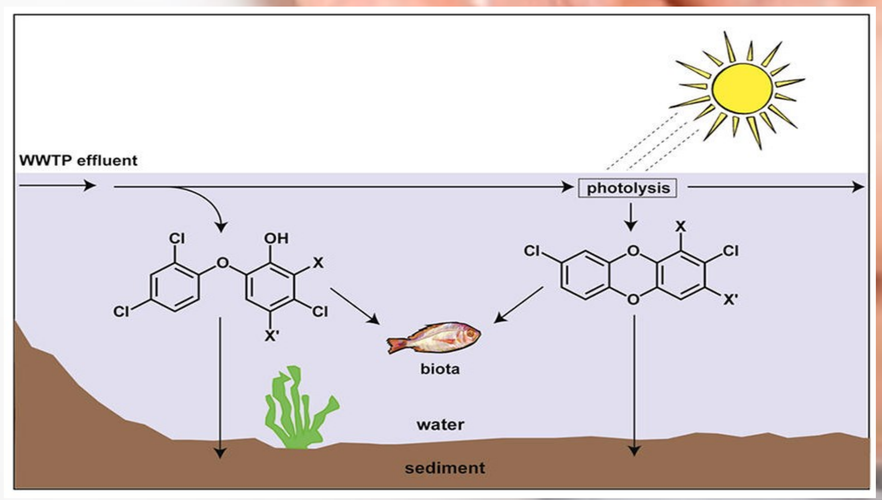
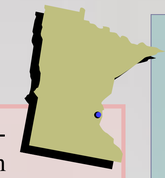


Image 2. An image of how triclosan enters the water and soil of the environment and how it can photo-dissolve into dioxins



The Minnesota Government announced on March 5, 2013 that it would no longer purchase products that contain the ingredient

Environmental Concerns

- The U.S. Environmental Protection Agency estimates that more than 1 million pounds of triclosan are produced annually in the U.S.
- According to the U.S. Food and Drug Administration, 96 percent of triclosan products are disposed down residential drains
- Triclosan is found in 58 percent of 139 randomly sampled U.S. streams
- It has the ability to build up in aquatic sediments and affect the plants and animals of the surrounding ecosystem
- The animal effects include a loss of muscle control and the swimming ability of fish
- The aquatic plants lose the ability to uptake nutrients

Human Health Concerns

- Reports indicate that the increased use of triclosan products has lead to the accumulation of this chemical in human blood and urine
- This exposure has caused worry among scientists who have developed experiments researching the effects that triclosan and its dioxins have on humans
- Triclosan is proven to transform into carcinogenic dioxins when it is exposed to chlorine and light (as seen in image 2)
- One study in Norway showed that in a sample of 2,000 people, 80% of them were more likely to have an allergy if triclosan was found in their urine
- Bacterium (such as *E.Coli*) have developed a resistance to the effects of triclosan

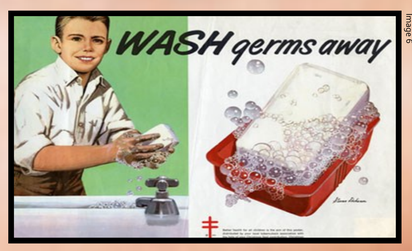


Image 6

Conclusion

The problem with triclosan is that it is difficult to weigh the benefits verses the cons of manufacturing. Triclosan is an effective antimicrobial agent and it is a great addition to hospital scrubs as well as oral products in prevention of gingivitis. The negatives include the unknown side effects that it has on humans and the environment. More studies are needed to be done to support past results on the loss of muscle control in mice and the correlation of triclosan concentrations and antibiotic resistance. Combining research with public education, the potential problem of triclosan can be avoided and these undesirable effects can be avoided.

Image 1. Dorothy Matthews and Amanda Serafini, "Microbrial Resistance to Triclosan," in The American Biology Teacher, ed. Health & Medicine (University of California Press, 2009).
Image2. Arnold et al., "Removal and Formation of Chlorinated Triclosan Derivatives in Wastewater Treatment Plants Using Chlorine and Uv Disinfection."; Anger et al.,"Quantification of Triclosan, Chlorinated Triclosan Derivatives, and Their Dioxin Photoproducts in Lacustrine Sediment Cores."
Image3.http://images.discountofficeitems.com/orig/75e/37e/3bd5c8d92ac3820c4c3450beb89ec68e56.jpg
Image4.http://www.bing.com/images/search?q=revlon+colorstay+lip+gloss&qs=SC&sk=&FORM=QBIR&pq=revelon%20colorstay%20lip%20gloss&sc=-57&sp=1&cp=SC&sk=#view=detail&id=8034260A805CD2054C5E9043D89F8BFFA6B68A8&selectedIndex=2
Image5.http://www.bing.com/images/search?q=clearasil+with+triclosan&FORM=HDRSC2#view=detail&id=A99291689541 2C1459EC22F65C49CA4F6E0776B80&selectedIndex=27
Image 6.b. ttp://i.walmartimages.com//00/01/70/00/99/0001700099336_500X500.jpg
Image7.http://www.bing.com/images/search?q=wash+your+hands+advertisment&qs=n&form=QBIR&pq=wash+your+hands+advertisments&sc=0-13&sp=-1&sk=#view=detail&id=1FCA916023E308CE906B31CDCD2226EE9BC32018&selectedIndex=319
Table 1. Preliminary Assessment; `Triclosan," ed. Environment Canada (March 2012).