ANTIBACTERIAL SOAP:
UNNECESSARY AND HARMFUL

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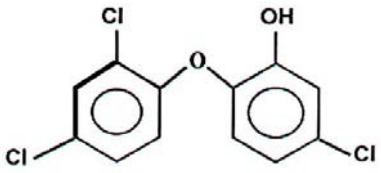
INTRODUCTION

Among all of the environmental detriments that our waterways face, such as increasing temperatures and pollution, our marine life is also being threatened by one of the most commonly used household products, your antibacterial soap. Manufacturers have been pumping antibacterial agents into soap for several decades but it has only been within the last ten years that antibacterial soaps have been widely used. A comprehensive assessment of antibacterial soaps in 2001 found that antibacterial agents were present in 76% of liquid soaps and 29% of bar soaps available in national, regional, and internet stores. [1] Now as more and more people are purchasing and using antibacterial soaps, the damage to our oceans, lakes, and rivers will continue to increase.

The common antibacterial agent, triclosan, has been shown to be persistent in water from our kitchen sink to the ocean and to have a significant effect on some marine species. Additionally, studies have shown that triclosan may be a threat to public health due to its ability to create antibacterial resistance.



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PLAIN SOAP VS. ANTIBACTERIAL SOAP

Soap is generally made of fat (either animal or plant) and a strong alkali. Its molecules are structured so that it can bind to dirt and grease and can easily be rinsed off by water.[2] Plain soap has some ability to remove loose and transient microorganisms due to the physical rubbing during hand washing.[3] The main active and most controversial ingredient that is added to antibacterial soaps is triclosan, a synthetic compound. Triclosan is a broad-spectrum antimicrobial agent that kills bacteria, molds, and other microorganisms.[4] Triclosan kills microorganisms by

inhibiting a certain enzyme that is crucial to fat biosynthesis in the microorganism. Triclosan is synthesized by the Swiss company Ciba Chemical Specialty Products and registered under their trademark names, Irgasan® DP 300 and Irgacare® MP.[5] It is also used under other trademark names such as Microban® and Biofresh® when used in plastics and clothing. Triclosan has been around for more than three decades and is now used in products such as soaps, lotions, toothpaste, facial cleansers, cosmetics, clothing, and even in plastics of children's toys.[6] Triclosan is classified as a Class III drug by the FDA and registered as a pesticide by the EPA.[78]

PUBLIC HEALTH CONCERNS

Although triclosan is widely used as an antibacterial agent, there is very little evidence that triclosan prevents disease when used in household consumer products such as soaps. In a study evaluating the effectiveness of antibacterial household products in reducing viral infectious diseases in more than 1,000 participants, no significant differences in disease transmittance between people who used antibacterial soap and those who used non-antibacterial soap were observed.[9] A similar study by the Centers for Disease Control and Prevention (CDC) also found that there was no significant difference of disease transmittance between families in Pakistan who used antibacterial soap and those who used plain soap.[10] Not only is antibacterial soap ineffective in preventing infections and diseases, it can also create antibacterial resistance and form carcinogenic compounds.

ANTIBACTERIAL & ANTIBIOIC RESISTANCE

The misuse of antibacterial agents, which are used to prevent the

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transmission of pathogens, and antibiotics, which are used to treat infections, over the last several decades have led to the serious problem of antibiotic and antibacterial resistance. Triclosan is an agent has the potential to create antibacterial resistance. For instance, the use of triclosan is widely recommended in health care settings for the eradication for methicillin-resistant Staphylococcus aureus (MRSA), a bacterium that causes symptoms such as fevers, toxic shock syndrome, and even death. [11] [12] Resistance to triclosan, however, has been observed in this bacterium and several other bacteria species such as E. coli.[13] [14] Certain microbes can create resistance to triclosan using the mechanisms of mutation that is observed in antibiotic resistance.[15] Some bacteria that have developed resistance to triclosan can also develop resistant to antibiotics, drugs that are actually necessary in order to treat certain illnesses.[16] Because of the risks of increased antibacterial resistance, the American Medical Association publicly recommended that the use of antimicrobial products be avoided until further studies can verify its safety.[17]

The American Medical Association recommends the use of antimicrobial products be avoided!

TRICLOSAN CONVERTS INTO TOXINS

Recent studies have revealed that triclosan can form cancer-causing compounds in its everyday use. Triclosan was found to react with free chlorine in treated drinking water to create chloroform, a substance that the EPA classifies as a probable human carcinogen.[18] This brought about concern that the household use of triclosan may result in the inhalation or skin absorption of chloroform.[19]

"...when added to drinking water treated with chlorine, triclosan reacts and forms chloroform ... a human carcinogen!"

Triclosan also readily converts to dioxin when exposed to sunlight or undergoes combustion. Triclosan's molecular structure is very similar to the polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), both of which are very toxic dioxins.[20] Dioxins are a group of compounds formed from combustion processes, such as incineration and burning fuel, and commercial manufacturing. They are of concern because they accumulate in fat and can cause cancer, developmental problems, and other health risks in humans.[21] Numerous studies have proven triclosan's ability to form toxins. One experiment that spiked water from the Mississippi River with triclosan concluded that triclosan can convert to 2,8-dichlorodibenzo-*p*-dioxin in surface water through sunlight irradiation.[22] Another experiment found that polychlorinated dibenzo-p-dioxins are formed when triclosan is exposed to sunlight and also when commercial textile products treated with triclosan are combusted.[23] Triclosan's ability to form dioxins is harmful to both marine life and human health. Because dioxins bioaccumulate, or build up in the food chain, people can be exposed when they eat fish from dioxin-contaminated waters.

"...Triclosan's ability to form dioxins is harmful to both marine life and human health ... because dioxins build up in the food chain."

ENVIRONMENTAL AND MARINE LIFE CONCERNS

TRICLOSAN PERSISTS IN WATERWAYS

Because 96% of products that contain triclosan, such as personal care products and pharmaceutical products, are eventually disposed of down the drain, it is important to learn about the effects that triclosan has on our waters and our marine ecosystem.[24] Various studies have shown that triclosan is not completely removed from waste water during treatment. In a thorough calculation of the levels of 95 pharmaceuticals, hormones and other organic wastewater contaminants in US waters, triclosan was one of the most recurrently found pollutants, being found in 57.6% of the tested streams and rivers.[25] Treated wastewater and marine sediments in a province in Spain were found to have contained triclosan up to 22 mg/l and 130.7 mg/kg respectively.[26] In a study done in Sweden, triclosan was found in high levels in wild fish whose water received treated wastewater and in the bile of rainbow trout temporarily exposed to the wastewater.[27] In the same study, triclosan was also found in high levels in human breast milk.[28] Although one study found that the average removal rate of triclosan at various treatment plants was 95.6%, the removal rates were found to be highly variable, including a treatment plant that was completely ineffective at removing triclosan.[29]

Triclosan may not be completely removed from wastewater during treatment! This can effect marine animals.

TOXIC TO MARINE ORGANISMS

Triclosan is also toxic to certain aquatic species. A study was done to investigate triclosan's effects on the

Japanese medaka, a fish species commonly used to evaluate whether or not a substance is an endocrine disrupting chemical (EDC). The results of the study showed that triclosan is highly toxic during the early life stages of the medaka, decreasing the hatchability of fertilized eggs and increasing the time it took the eggs to hatch. Additionally this study also found that triclosan may be a weak estrogenic compound with the ability to induce a female compound in male medaka.[30] Triclosan was found to have caused open locked jaws, erratic swimming, abnormal curved spine, and dormancy in the fish species, the rainbow trout.[31] In a study assessing the impact of triclosan on algae, algal communities from treated wastewater in Cedar Creek, KS, were obtained and then dosed with triclosan. It was observed that triclosan significantly reduced the diversity of the algal community, increasing the biomass of some species while decreasing the biomass of others.[32] Because algae are at the bottom of the aquatic food chain, any changes that occur to its population will affect the rest of the marine ecosystem.[33]

When the diversity of algae is altered in a natural waterway, the entire aquatic ecosystem can be disrupted!

"...many (study) results contradict each other and (researchers) battle each other on the issue of triclosan's safety."

RECOMMENDATIONS

Recommendations: FOR PUBLIC HYGIENE AND HEALTH

More studies are still being done to learn about triclosan and its chemical characteristics. However many results contradict each other as researchers and interests battle each other on the issue of triclosan's safety. There is very little solid research proving the safety as well as the efficiency of triclosan and other antibacterial agents to prevent infection. There is, however, substantial evidence that triclosan can create resistance in certain microorganisms and transform carcinogenic compounds. Some of the country's most trusted health institutions,including the Centers for Disease Control and Prevention and the American Medical Association agree that antibacterial soaps are not necessary for general public hygiene or even for general hospital care.[34] [35] For optimal hygiene, the CDC recommends that people wash hands with plain soap and warm water for at least fifteen seconds.[36]

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Recommendations: ENVIRONMENTALLY SAFE PRODUCTS

It is very important for the sake of our marine environment to use soaps that do not contain triclosan. Moreover it is even more important to use non-toxic and environmentally friendly soaps. Because all soap eventually ends up in our waterways and has an impact on the marine life, it is best to purchase soaps that are non-toxic and contain mainly natural ingredients, such as vegetable

"...for the sake of our marine environment (it is very important) to use soaps that do not contain triclosan."

oils and plant derivatives. However, because soap is not considered a cosmetic by the FDA, manufacturers are not required to list all of their ingredients on their labels.[37] There is also no uniform and consistent system of certifying products that have labels such non-toxic", "biodegradable", and environmentally friendly". Some of these labels are certified by independent companies, such as Scientific Certification Systems and Green Seal, while others have no certification at all. Because not all labels can be trusted, it is up to consumers to determine whether or not a brand of soap is optimal for the environment. There is a user-friendly website called Eco-Labels (www.eco-labels.org) for consumers to determine what the labels on products really mean if they wish to investigate a certain product. Additionally consumers can purchase from reputable environmentally-friendly soap manufacturers, such as Epic, Earth Friendly Products, Ecover, and Dr. Bronner's, rather than from mainstream brands, which usually contain harmful and synthetic compounds.

Epic products are a good alternative!

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