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REPORT

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TRICLOSAN

The purpose of this report is to address quite a lot of "de-bunked e-information" about triclosan. One such controversy is about unsafe levels of "dioxins" as synthetic impurities in triclosan. For your information, the FDA's position is that "It is possible that triclosan may sometimes contain dioxin, but it would be in such minute quantities as to pose no danger to human beings". The FDA is absolutely correct. [Please click here to see the attached report.](#)

The other controversy revolves around "triclosan's ability to create "superbugs" or promote "resistant micro-organisms". This has been mostly contributed to credible research from Tufts University School of Medicine, published in "Nature" which has been taken completely out of context by the media. There are other similar studies by the researchers at St. Jude's Children's Research Hospital. [View the Tufts University Study](#) as it was published in "Nature" and a [short abstract of the St. Jude's study.](#)

Effectiveness of triclosan against any microorganisms is dependent on the level of active triclosan available in the finished products. Unfortunately, part of this hype about "super bug" is somewhat true, because quite a lot of products containing triclosan do not actually contain any or very little active amounts of triclosan. This insufficient amount could promote resistance to triclosan. FDA levels of effectiveness for triclosan are 0.1 - 1.0 %. This is much like taking antibiotics for 1 or two days instead of the full 5-7 days. With insufficient amount of triclosan, you could indeed promote resistance to triclosan. However, this is not the case for LSC products.

The research at Tufts University, was the first evidence that triclosan acts on a specific bacterial target, rather than as a nonspecific "biocide". The mode of action in triclosan is studied and it

shows that it behaves as an antibiotic with action targeting *fabI* fragments of *E.coli*. The study starts with five independent triclosan-resistant mutants of *E.coli* K12 strain AG100 isolated using 0.00002% triclosan. The result clearly indicates that triclosan must be used in effective amounts sufficient to kill microorganisms in order not to induce resistant activity. LSC uses 0.3% and 0.58% triclosan in formulating its Anti-Microbial Moisturizer and Anti-Microbial Cleanser, respectively.

It has been shown that triclosan inhibited an enzyme in fatty acid biosynthesis produced by a gene called *fabI*, and that mutations in the *fabI* gene caused resistance to triclosan. The researchers at St. Jude's Children Research Hospital explain how this resistance occurs. The researchers pinpointed that the formation of a specific complex (*FabI*-NAD⁺-triclosan) accounts for the effectiveness of triclosan as an antibacterial agent. If the formation of this complex is prevented, bacteria can become resistant to triclosan. They identified a specific mutation in the *fabI* gene that prevents the formation of this complex and thus, creates resistance to triclosan. Finally they suggest that the widespread use of this drug will lead to the appearance of resistant organisms that will eventually compromise the usefulness of triclosan, and other antibacterial that interact with the same target.

The point of this discussion is that specific mutations in the *fabI* gene caused by triclosan and other antibacterial will lead to resistant organisms. Therefore, to prevent these mutations, triclosan must be used in effective amounts sufficient to kill microorganisms without making resistant mutants. According to Tufts' study, this amount must be more than 0.007% triclosan against *E.coli* K12 strain AGT11. This is the reason why LSC products use 0.3% or 0.58% triclosan.

With regard to LSC products, LSC has a special manufacturing know how to keep triclosan active post bottling. The reduced active triclosan in products has often been observed due to lack of manufacturing technology regarding use of triclosan. As mentioned before, FDA requires 0.1-1% triclosan, but unfortunately FDA has not yet set standards to make sure these amounts are active in finished products. LSC products have the criteria so that 0.3% triclosan labeled on bottles of LSC products means the existence of 0.3% active triclosan in the products post bottling.

Getting back to the issue of resistance bacteria: there have been controversial discussions regarding triclosan because of hypothesis that it may promote triclosan-resistant bacteria. However, the point is how the results of these *in vitro* tests are associated with the real influence on human bodies. Actually using a strain of *Escherichia coli* genetically modified, it was reported that half of a random shopping-list in supermarkets could stimulate the efflux receptor as triclosan did. Furthermore, several reports have described strains of bacteria that appear to have acquired reduced susceptibility (when defined by MICs established *in vitro*) to certain antiseptics (e.g., chlorohexidine, and quaternary ammonium compounds). However, because the antiseptic concentrations that are actually used by health-care workers are substantially higher than the MICs of strains with reduced antiseptic susceptibility, the clinical relevance of all of these *in vitro* findings are questionable, as skin re-generates and one's skin is never exposed to the same exact microorganism.

The conclusion of these various studies clearly indicates that triclosan must be used in effective amount sufficient to kill microorganism in order not to induce resistant activity.