



Can Triclosan Be Harmful to Human Health?

TRICLOSAN IS A CHEMICAL added to many consumer products—including toothpaste, soaps, and deodorants—to kill microbes. Lately, triclosan has been receiving a lot of bad press because of worries about its potential health effects. There is a lot left to learn about this chemical, and its many uses in our society remain open for discussion.

It looks like a hormone...

There is no doubt that triclosan kills microbes, but its ability to mimic important molecules in our bodies, called hormones, and to interfere with their activities is less clear. Hormones are molecules that send essential messages between different parts of our bodies. **Two types of hormone that triclosan is suspected of mimicking are estrogen, which is produced by the ovaries and controls female sex characteristics; and thyroid hormones, which control metabolism—the conversion of food into energy.** Triclosan is thought to mimic these hormones because of some general similarities in their structure. Many health concerns about triclosan center on this mimicry.

...But does it act like one?

Some research suggests that triclosan may not be a very good mimic of estrogen and thyroid hormones. Dave Furlow, a professor at the University of California (UC), Davis, and colleagues invented a cell line to test whether a compound interferes with thyroid hormones. When a chemical binds to the thyroid hormone receptor in these cells, they produce a chemical, called luciferase, that fireflies use to light up at night (Fig. 1). Researchers can then measure the amount of light to determine how strongly a chemical binds to the receptor.

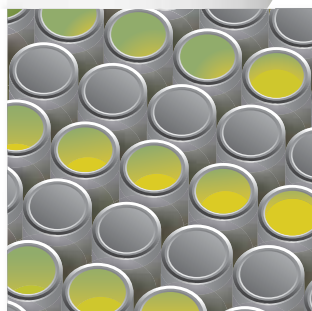


Figure 1. Each well contains cells and a solution with a different chemical that may bind to a receptor, such as the thyroid hormone receptor or estrogen receptor, in the cells. When a chemical binds to the receptor, the cells produce a chemical called luciferase that emits light. How strongly a chemical binds to the receptor determines the amount of light emitted by the cells.



Scientists at the U.S. National Institutes of Health have found that triclosan binds to the thyroid hormone receptor only weakly, suggesting that triclosan does not interfere significantly with the thyroid hormones in our bodies.

Similarly, Michael Denison, another professor at UC, Davis, and colleagues have tested the effects of triclosan in ovarian cancer cells designed to produce luciferase when a compound binds to the estrogen receptor. In these studies, triclosan had no estrogen-like activity at all. These results suggest triclosan does not effectively mimic estrogen inside the body.

Reasons for concern

However, Rolf Halden, a professor at Arizona State University, is concerned that triclosan could interfere with molecules that bind to a receptor called the aryl hydrocarbon receptor (AhR). Normally, when this receptor is activated, it causes cells to undergo changes that are important in human development, but when some environmental pollutants bind to this receptor, it can lead to birth defects or cancer. Halden emphasizes that although there is much we do not know about triclosan, we know that this chemical is widespread in our environment as a result of pollution and we also know that it can be modified by our bodies to bind to the AhR receptor—which is concerning given how important this receptor is for healthy development.

Share information with us!

Because of its chemical structure and the way it is processed in our bodies, triclosan could interfere with our hormones. But how can we know for sure? Scientists are continually performing new studies to help answer this question, and you may find more answers by looking for reliable information online and discussing this topic with your friends and family. If you find interesting information, please feel free to share it with us by sending an e-mail to: chemmatters@acs.org.