

Hello, this is Anne Johnson, and I'd like to welcome you to the National Institute of Environmental Health Sciences Superfund Research Program monthly Research Brief podcast.

This month, we're discussing how SRP researchers determined that triclosan promotes liver tumor growth in mice.

The Research Brief, Number 241, was released on January 7, 2015, and was written by SRP contractor Sara Mishamandani in conjunction with SRP-supported researchers Robert Tukey and Bruce Hammock.

A collaborative study showed that long-term exposure to triclosan promotes the growth of liver tumors in laboratory mice, raising concerns about its safety for humans. Triclosan is a common antibacterial chemical used in a wide variety of consumer products, such as cosmetics, soaps, detergents, and toothpaste. The study was performed by Superfund Research Program scientists from the University of California, San Diego and the University of California, Davis and appeared in the Proceedings of the National Academy of Sciences.

According to the authors, triclosan has become one of the most common additives used in consumer products and has been found in 97 percent of breast milk samples from lactating women and in urine of nearly 75 percent of people tested. Triclosan is also listed as one of the seven most frequently detected compounds in streams across the United States; approximately 1,500 tons continue to be produced annually worldwide.

"Triclosan's increasing detection in environmental samples and its increasingly broad use in consumer products may overcome its moderate benefit and present a very real risk of liver toxicity for people," said study leader Robert Tukey, director of the UC San Diego SRP Center.

As stated by the study authors, although triclosan has been tested in cell-based platforms with no detectable carcinogenic activity, triclosan *in vivo* has been largely unexplored. Scientists investigated long-term exposure to triclosan in mice by treating them with triclosan for six months, which is roughly equivalent to 18 human years. They then looked at the effects on the liver compared to mice that were not exposed to triclosan.

Researchers found that chronic exposure to triclosan in mice causes liver damage and liver cell death. They also found that triclosan exposure in mice increased susceptibility to tumor formation through enhanced cell growth, liver fibrosis (which is excessive accumulation of proteins in the liver), and proinflammatory responses, which are characteristics within which human cancer forms.

Scientists discovered that triclosan interferes with the constitutive androstane receptor, which plays a role in detoxifying the blood. To compensate for this interference, the liver overproduces cells, which can lead to fibrosis and cancer. According to the authors, evidence from this study indicates that triclosan plays a role in promoting liver fibrosis, which can lead to liver cancer.

Although the animal studies used higher concentrations than generally predicted for human exposure, the study indicates that triclosan can promote tumors in the liver and that the way triclosan acts on the

mouse may be relevant to human physiology. The study authors concluded that because of this new evidence, the potential of triclosan to cause liver cancer in humans should be evaluated.

“We could reduce most human and environmental exposures by eliminating uses of triclosan that are high volume, but of low benefit, such as inclusion in liquid handsoaps,” said Hammock, director of the UC Davis SRP Center. “Yet we could also, for now, retain uses shown to have health value – as in toothpaste, where the amount used is small.”

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If you'd like to learn more about this research, visit the Superfund Research Program website at www.niehs.nih.gov/srp. From there, click on “Who We Fund” and follow the links to the UC San Diego and UC Davis research summaries. If you have any questions or comments about this month's podcast or if you have ideas for future podcasts, contact Maureen Avakian at avakian@niehs.nih.gov.

Join us next month as we discuss more exciting research and technology developments from the Superfund Research Program.