

Researchers examine effects of flame retardants

May 1 2015, by Katie Pence

There's nothing like napping on the couch during a lazy weekend or lounging cozily while watching your favorite sporting event on television.

But Susan Kasper, PhD, associate professor in the Department of Environmental Health at the University of Cincinnati (UC) College of Medicine and a member of the UC Cancer Institute, says those comfy couch or chair cushions—or more so what's on them—may potentially lead to cancer down the road.

Her lab is specifically studying the effects of Firemaster 550 on human [prostate cancer cells](#). Firemaster 550 is a new-generation flame retardant mixture and was previously the second most commonly detected flame retardant in polyurethane foam in the U.S.

"Research in my laboratory over the past several decades has focused on the mechanisms by which prostate cancer develops and progresses to become therapy-resistant," she says.

Since coming to UC in 2008, she and her collaborators Scott Belcher, PhD, professor in the Department of Pharmacology and Cell Biophysics, and Heather Stapleton, PhD, Dan and Bunny Gabel Associate Professor of Environmental Ethics and Sustainable Environmental Management within the Nicholas School of the Environment at Duke University, have studied the role of environmental toxins in initiating and promoting [prostate cancer progression](#). This includes [flame retardants](#) that are

commercially used in electronics, building insulation, polyurethane foam, wire and cable. Some types of flame retardants are associated with health and environmental concerns.

"Many flame retardants are known to be persistent organic pollutants, meaning that they are resistant to breakdown and capable of remaining in the environment for many years. In addition, they are often absorbed in the food chain and stored in fatty tissues," she says.

Kasper says past studies have shown that when tested, most Americans were found to have trace levels of flame retardants in multiple tissues, including adipose (fat), liver, muscle, skin and blood.

"Importantly, flame retardant chemicals can interfere with normal hormonal functions by either mimicking or inhibiting their activity," she says. "Animal model studies have linked exposure to flame retardants to developmental defects, altered neurologic function, infertility and cancer and even genetic modifications that are passed down to future generations.

"Prostate cancer stem cells make up less than 0.1 percent of the total number of [tumor cells](#), but they are key in promoting tumor growth, metastasis and the emergence of treatment-resistant disease. Using prostate cancer stem cell-like cells derived from human biopsy specimens, our initial findings show that several Firemaster 550 components are capable of stimulating the rapid expansion of prostate cancer stem cells. This response is similar to that observed in prostate cancer stem cell-like cells treated with antiandrogens which are designed to block testosterone-mediated activity and inhibit prostate cancer cell growth. This response is unexpected since prostate cancer cells typically require androgens for growth, and androgen deprivation therapy in patients with prostate cancer causes tumor regression."

"These findings suggest that Firemaster 550 is an endocrine disrupting chemical capable of promoting the expansion of [cancer stem cells](#)," she continues. "Since [prostate cancer](#) stem cells are thought to be resistant to antiandrogen therapy, expansion of this cell type could replace tumor [cells](#) eliminated by [androgen deprivation therapy](#) and promote resistance to treatment."

Kasper says these findings may also imply that this particular fire retardant could affect non-cancer processes that are dependent on testosterone, including the development and function of the male reproductive system and male fertility.

"The available data on flame retardants indicates a high likelihood that other, unstudied members of this class of chemicals could also function as endocrine disruptors to impair normal developmental processes and promote disease," she says.

"Further research is critical for understanding the effects of flame retardants on regulating normal and disease processes. This would provide fundamental data which could be used to influence public policy and reduce our global exposure to harmful environmental toxicants."

Provided by University of Cincinnati

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