

Flame retardants might pose risks for gymnasts, researchers suggest

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As girls, a group of 11 collegiate gymnasts spent many hours each week perfecting their sport in gyms with pits filled with foam blocks for protection. Now young women, they agreed to be tested in a new study that found that the flame retardants in the blocks can break down in dust and end up in gymnasts' bodies.

"We called it pit dust. It was all over the gym. You'd come out of the pit and you're covered with a film of pit dust." said Courtney Carignan, a former gymnast who's the author of the report, along with Heather Stapleton, a national expert on [flame retardants](#) at Duke University, and other scientists.

Published online last month in the journal *Environmental Science and Technology*, the report found that the level of one [chemical](#) in the flame retardant PentaBDE was six times higher in the bodies of the gymnasts in the study than in the average population. The average level of PentaBDE in the gym's air and dust was 200 times higher than that found in homes.

What that level of exposure - or any level - means for human health is something scientists are working to understand.

"We were really surprised to see how high the levels actually were, both in terms of the levels in the air - what was just in the dust - and the levels in the blood measured for the gymnasts," said Stapleton, an associate professor of environmental sciences and policy.

The study focused on exposure to PentaDBE, a flame retardant chemical mix that was phased out in the United States in 2005 but remains in the body for a long time. These and other flame retardants are still found in the [foam](#) cushions inside couches, casings in electronics, carpet padding and baby products. They are also in many of the foam cubes used as soft landings in gymnastics and at children's recreation centers.

Studies have associated the chemical with reproductive problems and changes in thyroid hormones. Some recent studies have found possible links between heavy exposure before birth and brain development problems, including low IQ scores.

The studies don't prove that the chemical is the cause of all these problems, but their evidence is strong, Stapleton said.

The gymnast study concluded that the substance got onto gymnasts' hands when they touched pit cubes, landing mats and dusty surfaces in the gym, and then could be ingested or inhaled.

Carignan suggested that gymnasts wash their hands after practice and before eating. She doesn't recommend that gyms replace their foam yet because it's not clear what flame retardants new equipment might contain.

The authors of the study said their report was the first to look at gymnasts as a vulnerable population and that it showed the need for more investigation. The findings from 11 people at one gym can't be generalized to all gymnasts, they wrote.

Still, Carignan said in an interview, "There's a debate going on right now about how necessary are flame retardants and what can we do to reduce our reliance on them."

She and the other researchers caution on a website, gymnastcollaborative.org, that no one should suddenly change gyms or quit the sport out of fear of flame retardants, noting the sport's health benefits and that the purpose of the foam equipment is for safety.

"Our goal is to provide information to help inform decision-making," they say.

Craig Tuller of Fuquay-Varina, N.C., said the findings raised concerns for him about his older daughter, Katie, 25, who started gymnastics at 7 and continued through her undergraduate years at Boise State University, and for his 9-year-old daughter, Grace, who's also learning gymnastics.

"Every gym I've ever been in has that kind of pit, and kids love to play in it," he said.

Tracie Shere of Apex, N.C., whose daughters, Tehya, 9, Lila, 7, and Kennedy, 5, have taken gymnastics on and off, said she hadn't heard of the study but that any exposure to chemicals for her children was a "huge concern," especially because her children were so young when they started jumping in the gymnastics pits.

The older girls started to take gymnastics when they were 3, and Kennedy tried it for a while before she was 2, their mother said. Every sport has risks, Shere said, but ingesting chemicals?

"That was one I never even contemplated before," she said.

Bryan Goodman, a spokesman for the American Chemistry Council's North American Flame Retardant Alliance, said the study didn't report on health hazards, and he noted that exposure alone doesn't mean that a chemical causes disease or other adverse effects.

He said companies evaluated new fire retardants for safety and efficacy and gave their evaluations to government regulators before the products were used.

But under federal law, there's no requirement that companies prove that chemicals are safe before they're used or that they label what flame-retardant chemicals are in commonly used products.

"It comes really difficult to try to understand the magnitude of exposure to all the different flame retardants and what the sources are so that you could potentially reduce your exposure to these compounds," Stapleton said.

For her own children, ages 2 and 4, she tests materials in her lab and avoids those with the chemicals.

"Other people don't have that luxury," she said.

Carignan, who's now a postdoctoral researcher at the Children's Environmental Health and Disease Prevention Center at Dartmouth University, is the mother of a 2-year-old. She recently started teaching her son gymnastics, using a mat she bought that was labeled flame-retardant-free.

For people who wish to limit exposure, options have been limited.

A 1975 California rule required that foam in furniture meet flammability standards. So manufacturers filled it with flame retardants. Rather than make separate furniture for California, flame retardants were put into products to be sold everywhere.

California changed the rule last month by eliminating the flame test for foam. Now furniture makers may use a smolder-resistant covering or a

layer under the upholstery. The change opens the possibility for flame-retardant-free products to start to appear in stores. Compliance with the new rule will be indicated with labels that say Technical Bulletin 117-2013.

Bob Luedeka, the executive director of the Polyurethane Foam Association, said foam makers would have no problem meeting future orders that didn't require flame retardants, and that there'd be no change in price.

Meanwhile, Stapleton and other scientists keep testing products and chemicals. The chemical mix that was phased out, PentaBDE, was better understood than some of the newer flame retardants, she said. And despite the California rule change, flame retardants will continue to be widely used in offices, airplanes and other public places, and they'll remain in older couches, televisions and other products now in use, she added.

In the gymnast study, scientists also detected chemicals from two other types of flame retardants that are still commonly used in polyurethane foam.

One of them, TDCPP, is listed by California health authorities as a suspected carcinogen. It's the same flame retardant that was used in children's pajamas in the 1970s until it was banned. It still shows up in other products and in people, as well.

"We see it in everyone," Stapleton said.

The other is Firemaster 550.

Last year Stapleton and Heather Patisaul, an assistant professor of biology at North Carolina State University, released a study looking at

Firemaster 550 exposure in pregnant rats. Up to that point, the public information on potential health effects was very limited, Stapleton said.

Their study found that Firemaster 550 exposure resulted in thyroid hormone changes in the exposed rats and extreme weight gain, early onset of puberty, cardiovascular changes and increased anxiety in their offspring. Scientists need to know more about the health effects and are following up with more studies, Stapleton said.

"We know almost the entire country is exposed to this chemical at some level," Stapleton said. "We just don't know what level causes effects."

Stapleton's lab recently tested 42 children's products for the Center for Environmental Health, an advocacy group in California. The center said in a news release Nov. 20 that the lab found flame-retardant chemicals in 38 of the items. Twenty-two of them contained Firemaster 550. Two contained TDCPP. Two other flame-retardant chemicals were detected, as well.

Congress has held hearings in recent years on updating the 1976 Toxic Substances Control Act. Stapleton was invited to testify at one last year.

The act set up a way for the Environmental Protection Agency to regulate new commercial chemicals before they enter the market and existing chemicals when they pose an unreasonable risk.

Some members of Congress and the EPA itself would like to see the act strengthened to improve protections from [exposure](#) to harmful chemicals.

Unlike laws that apply to drugs and pesticides, the Toxic Substances Control Act doesn't have a mandatory program that would allow the EPA to determine whether existing chemicals are safe. The law sets high

hurdles before the agency can require companies to submit data on the [health effects](#) of chemicals, though the companies may do so voluntarily.

The EPA also has found it difficult to ban chemicals under the law. For example, the agency banned asbestos but a federal court overturned that decision, saying it didn't meet the requirement of the law.

The law grandfathered in 60,000 chemicals that existed when it was passed.

In 37 years, the EPA has required testing on about 200 out of 84,000 chemicals that have been inventoried under the law and has regulated five.

James Jones, the assistant administrator of the EPA's Office of Chemical Safety and Pollution Prevention, testified before a subcommittee of the House Energy and Commerce Committee in November that the toxic substances act was "an important step forward" in its day.

"But over the years," he said, "not only has TSCA fallen behind the industry it is intended to regulate, it has also proven an inadequate tool for providing the protection against chemical risks that the public rightfully expects."

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