Medical Xpress

The battle against the lingering, harmful residue that smoking leaves behind

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When cigarette smoke is blown into the environment, its chemical constituents don't just vanish into thin air. Residue from the smoke settles into, accumulates and is stored in the surrounding environment, such as upholstery, carpets, walls, clothing and curtains.

The residue can be detected long after the last cigarette has been extinguished. This so-called thirdhand smoke presents an under-recognized danger to human health and especially to young children and people with compromised immune systems, according to a multidisciplinary research team at San Diego State University. SDSU researchers are studying just how wide-spread and persistent thirdhand smoke can be and exploring ways to eradicate it from the home.

SDSU psychologist Georg Matt first became interested in thirdhand smoke about 20 years ago in a smoking cessation study that discovered nicotine byproducts could still be detected in the children of mothers who were former smokers, even after they had quit smoking and no one else smoked near the child. The finding puzzled researchers: If the children were not exposed to secondhand smoke, how were they still being exposed?

The answer came to him when he noticed patterns of behavior in his own young children—how involved they were in their environments, touch and explore everything, and how often they put non-food items in their mouths.

"Hands are sampling devices of surface in our immediate environment, as we like to say," Matt said.

Bottomless pit for toxicants

If byproducts of smoked tobacco remained in the room, then it was no wonder the kids of former smokers were still being exposed. The smoke may have cleared but it left behind a toxic, less evident mess.

"Homes become reservoirs of tobacco smoke pollutants," Matt said. "These volatile compounds soak into the drywall; gypsum is like a bottomless pit for these toxins. Carpets are tremendous reservoirs."

Penelope Quintana, an environmental health scientist and one of Matt's colleagues, noted that people are probably most familiar with thirdhand smoke residue as the yellowing of walls in a home. Most people don't notice it until they remove a picture and find a stark white square behind it. But chemical residue can be absorbed into pretty much any porous surface, then leaches out over time.

Matt, Quintana and environmental chemist Eunha Hoh today study thirdhand smoke in a range of environments where an unsuspecting public might encounter the lasting aftereffects of smoking: rental housing units, newly purchased homes, rental cars, hotel rooms and casinos. SDSU's team is among the leaders in the growing field of thirdhand smoke research and is part of the Thirdhand Smoke Research Consortium.

Environmental contaminants

Everybody knows that smoking cigarettes and being around active smokers is dangerous to people's health. But how dangerous is the residue smoking leaves behind? Over time, it can be quite dangerous,

Hoh explained.

"Cigarette smoke is known to contain thousands of chemicals, and these chemicals get deposited onto surfaces," she said. "A great many of them are known to be toxic and carcinogenic. The levels of these chemicals may be quite low in thirdhand smoke residue, but they are dangerous when you have chronic exposure."

There's a long and notorious list of dangerous chemical compounds in cigarette smoke that researchers can look for in thirdhand smoke residue. What's more, as these chemicals hang around in their environment, they can undergo further chemical reactions that turn otherwise innocuous compounds into harmful ones, Matt added.

But those chemicals are only part of the problem. There are many more potentially dangerous compounds lurking in the residue that public health specialists don't yet know about. Hoh specializes in a high-tech form of chemical examination known as non-targeted analysis that can detect the presence of these unknown chemical compounds. So far, she and her colleagues have found a link between thirdhand smoke and the presence of extremely hazardous carcinogenic compounds known as polycyclic aromatic hydrocarbons, or PAHs.

Besides increasing cancer risk, these compounds can also trigger asthma attacks and eye, lung and throat irritation. They can also interfere with wound-healing and cause cardiovascular problems.

Simply dusting or vacuuming doesn't get rid of the danger, either. Not even painting over residue-stained walls is enough to contain these compounds, Quintana explained.

"We were really surprised by how persistent the contamination is in the home, even months after people have stopped smoking in it," she said.

Vulnerable populations

The combination of thirdhand smoke's persistence and health dangers is a particular concern for children, Quintana said. Because of their propensity to put their hands and other objects in their mouths, and because they spend more time low to the ground where house dust accumulates in carpets, kids are at a higher risk of suffering harmful health effects due to thirdhand smoke.

Even more vulnerable are children in lower-income families, who are more likely to move frequently and live in rented homes where there is a greater likelihood that previous inhabitants smoked. To address this risk, the U.S. Department of Housing and Urban Development (HUD) recently awarded Matt, Quintana and Hoh a $700,000 grant to look at the best ways to reduce the risk of thirdhand smoke in HUD-subsidized housing.

Over the next three years, the researchers will recruit study participants in 200 low-income homes and offer a variety of clean-up services that range from simple dusting to professional deep cleaning, then periodically analyze the houses for traces of thirdhand smoke. They hope to find an effective, affordable method for making these homes safer from thirdhand smoke risk.

"There are no real known solutions for cleaning up thirdhand smoke," Hoh said. "We need to find a way to get rid of it.

Avoiding thirdhand smoke

Around the holidays, we spend a lot of time traveling and with family members and friends who might be smokers. How can you best protect yourself and your children from the effects of thirdhand smoke? San

Diego State University psychologist and thirdhand smoke researcher Georg Matt offers these tips:

- Don't actively smoke or use electronic cigarettes in the home or car.
- If you have visitors who smoke or use electronic cigarettes, ask them not to smoke indoors.
- If you visit family and friends who smoke indoors, stay overnight in a smoke-free hotel.
- Insist that visitors do not to smoke or use electronic cigarettes in the presence of children.
- Request that smokers wash their hands and, if possible, change their clothes after smoking.
- If you rent a car, insist on a smoke-free vehicle. Reject any car that smells of smoke.
- When staying at hotels, request smoke-free rooms and decline any room that smells of smoke. Whenever possible, try to find hotels that are 100-percent smoke-free.
- When you rent your next apartment or buy your next home make sure to ask about tobacco use. Stay away from apartments and houses where former residents smoked.
- Quitting smoking is very hard but also extremely rewarding. You, your family, friends, your community will live longer and healthier lives.
- Don't give up—it typically takes six or more quit attempts before a smoker can quit for good. Consult with your primary care physician or contact the California Smoker's Helpline.

Provided by San Diego State University

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