What does the smell of stale tobacco smoke mean?

The Short Answer

Thirdhand smoke is the chemicals left behind when someone smokes tobacco. Thirdhand smoke is unhealthy for people and pets. It can stick around for a long time in homes and cars. It gets into your body if you inhale, swallow, or touch the chemicals. Getting rid of it is really hard and can cost a lot of money.

If you smell stale tobacco smoke, thirdhand smoke is in the air. What you smell are the toxic chemicals that are released into the air from nearby contaminated sources, such as carpets, walls, and furniture. As soon as your nose picks up the odor, the polluted air gets into your lungs. From there, the toxic chemicals get into your blood and into every part of your body.

However, thirdhand smoke can still be present even if you don't smell stale tobacco smoke. There may be too few chemicals in the air for you to detect, or the chemicals may be entirely odorless.

The Long Answer

Thirdhand smoke is the chemical residue from tobacco smoke. It is also called "tobacco smoke residue" or "stale tobacco smoke." The chemicals in thirdhand smoke are toxic to humans, especially children. It can linger for years in dust and on household surfaces. It can also become embedded in carpets, furniture, clothes, and building materials. It is difficult and expensive to remove.

Have you ever walked into a room and smelled the scent of stale tobacco smoke? Or maybe smelled it as someone walked by? The smell of stale cigarette smoke--even when no one is smoking-- means that thirdhand smoke pollutants have been released into the air from the surfaces where they accumulated, such as carpets, walls, and furniture. As you breathe in, odor receptors in your nose recognize the chemicals in thirdhand smoke and trigger a signal in your brain that allows you to notice stale tobacco smoke while simultaneously bringing thirdhand smoke pollutants into your body.

Thirdhand smoke pollutants contain chemicals that can harm many of your organs (including the nose, throat, lungs, and liver), damage how your cells normally function, damage your DNA, and cause cancer. Recent studies have found similar impacts from thirdhand aerosols from e-cigarettes.

Even when you cannot smell tobacco smoke, thirdhand smoke can still be present. Your sense of smell is a good warning system, but you can only smell an odor when the amount of a chemical is above the level that your nose can detect. In addition, some of the chemicals in thirdhand smoke are odorless; you cannot smell them no matter how much are present.

So, while the smell of stale tobacco smoke can be a good indicator of thirdhand smoke, you can still be exposed to these harmful chemicals even if you cannot detect them.

Do you have more questions about the toxic legacy of tobacco smoke, how it affects human health, and what we can do about it? Learn more here.

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Sources:

Hang B, Wang P, Zhao Y, et al. Adverse health effects of thirdhand smoke: From cell to animal models. *International Journal of Molecular Sciences*. 2017;18(5):942. doi: 10.3390/ijms18050932

Martins-Green M, Adhami N, Frankos M, et al. Cigarette smoke toxins deposited on surfaces: Implications for human health. *PLOS One*. 2014;9(1). doi: 10.1371/journal.pone.0086391

Matt GE, Quintana PJE, Zakarian JM, et al. When smokers quit: Exposure to nicotine and carcinogens persists from thirdhand smoke pollution. *Tobacco Control*. 2016;26(5):548-556. doi: 10.1136/tobaccocontrol-2016-053119

Matt GE, Quintana PJ, Zakarian JM, et al. When smokers move out and non-smokers move in: Residential thirdhand smoke pollution and exposure. *Tobacco Control*. 2011;20(1). Epub 2010/10/30. doi: 10.1136/tc.2010.037382

Pozuelos G, Kagda M, Schick Set al. Acute exposure to thirdhand smoke leads to rapid changes in the human nasal epithelial transcriptome. *JAMA Network Open*. 2019;2(6) doi: 10.1001/jamanetworkopen.2019.6362

Thorpe AE, Donovan C, Kim RY, et al. Third-hand exposure to e-cigarette vapour induces pulmonary effects in mice. *Toxics*. 2023;11(9):749. doi: 10.3390/toxics11090749