

Exposure to Methamphetamine

Methamphetamine (meth) is a powerful, highly addictive drug that affects the central nervous system.

Meth increases the amount of dopamine in the user's brain. Dopamine is a natural chemical that stimulates the part of the brain that controls pleasure, reward and motivation. The high dopamine levels create a strong desire for users to continue taking meth and they quickly and easily become addicted.

Meth can be found in pill, capsule, crystal or powder forms and can be smoked, snorted, injected or ingested.

Meth is often created in illegal, makeshift laboratories. However, the drug is also produced in more sophisticated labs and has pharmaceutical applications. Most meth in the US is produced in other countries. Meth use is a growing problem throughout Colorado and the United States.

Considering the contaminants used to make meth (e.g., ether, hydrochloric acid, anhydrous ammonia, red phosphorus), smoking meth produces similar chemicals and residuals.⁽²⁾ Smoking of crystal methylamphetamine (ice) can release contaminants into the surrounding environment, including methylamphetamine vapor, which settles as surface residue and can persist for several years.

The indoor environment of a building can become contaminated with methamphetamine residues if the drug is smoked within it. Residues are higher and localized in areas where smoking occurred (e.g., bathrooms) and are not usually found elevated elsewhere in the environment.

EXPOSURE

The presence of methamphetamine contamination does not mean someone will be exposed and become ill. Exposure can pose a risk if there is a realistic route, frequency and duration, and the doses are high enough throughout the exposure to produce an adverse health effect. Age, activities of the person exposed, level of contamination and the duration of exposure can influence the severity of the effects.

Symptoms of exposure to meth can include irritability, anxiety, sleeplessness, weight loss, a persistent cough, dizziness, difficulty breathing, headache, nausea and irritation of the throat, eyes and skin.

Per the California EPA's Reference Dose development research, at the lowest levels of exposure, the primary health effects are alertness and minor weight loss.

There are three main ways to be exposed to meth residue: inhalation, absorption through the skin and ingestion through hand-to-mouth contamination. The exposure of most concern for children is second-hand smoke inhalation from being in the presence of an adult smoking meth. Second-hand smoke inhalation represents a potential acute exposure many thousands of times higher than exposure via residue on a surface.

Passive, third-hand exposure to methamphetamine can happen from hand-to-mouth transfer from contaminated surfaces. Since meth does not absorb through the skin well, hand washing is considered an effective way to prevent or reduce third-hand exposure.

Unless someone is in the same room as a smoker or enters a small room immediately after the smoker leaves, inhalation exposure would be negligible.

Although there are cumulative effects from high-dose, long-term methamphetamine use, meth does not stay or accumulate in the body, which metabolizes the meth and excretes it through urine. Therefore, short-term and limited exposure does not represent a significant health threat.

Information from high-dose studies and clinical reports provides a better understanding of the mechanisms by which methamphetamine may exert its toxicity.

The first-hand health impacts of methylamphetamine use and abuse are reasonably well documented, with increasing severity of effects at increasing doses and blood concentrations.

Most of our knowledge of methamphetamine toxicity in humans is derived from drug abuse and overdose scenarios. Additionally, medicinal usage of low levels of meth (desoxyn) to treat obesity and ADHD is well documented. Health impacts from low-level, chronic exposures to methamphetamine have been extrapolated from the results of short-term studies and studies examining the effects of sustained-release formulations of methamphetamines.

Evidence of the impacts on health from second-hand exposure to meth is limited. However, some information is available regarding children living in clandestine laboratories and first responders to incidents involving manufacturing sites. Available studies are focused on residential exposure. For example, a study from Australia evaluated 25 separate case studies where the subjects had suffered third-hand exposure to methamphetamine from former manufacture, use or both.

COLORADO METH CLEAN UP LIMIT

In response to clandestine drug labs and the need to reoccupy these residences, Colorado adopted a standard for residential meth clean up. Colorado does not have a different standard for public spaces like a library. It is important to understand that Colorado's clean up standard is a technology-based standard, not a health-based standard.

When establishing a standard for clean up, it is essential to consider residents who may reoccupy the structure after contamination. Health impacts on infants and young children are of particular concern, especially for those raised in areas formerly used as clandestine labs or for heavy meth use. Therefore, clean up limits were set at levels well below those expected to cause effects to a child and were developed under the assumption that the child was in the exposed environment 24 hours a day, seven days a week, in close contact an industrial hygienist and associate professor at Colorado School of Public Health.

Children are often more susceptible to hazards due to their physiologic status (rapid growth, incomplete development and rapid metabolism requiring more air and water per body weight than adults) and behaviors (crawling, hand-to-mouth activity, gnawing on furniture, windowsills, toys).

It's important to understand toxicity assessments and exposure dose models have deliberately adopted very conservative assumptions with large safety margins built in. For example, Colorado's clean up standard has a built-in 300-fold margin of safety. In addition, uncertainty factors are used in deriving a reference/exposure dose to assure that more sensitive populations, such as children, are highly protected and to factor in uncertainties.

Methamphetamine levels that exceed the Colorado clean up standard of 0.5 µg/100 cm² should not be interpreted from a health perspective as a specific 'threshold' that, if exceeded (especially by a small margin (e.g., within an order of magnitude), is likely to result in an adverse health effect.

The State meth standards are highly conservative and assume worst-case scenarios that are unlikely to reflect a real-world situation at a public building. These standards are based on daily residential exposure to the most sensitive group (infants and small children). The magnitude and duration of exposure are far lower when someone may experience third-hand exposure to meth residues in a public building.

Based on the data and peer reviewed science available, exposure to meth residues in public spaces carries a low risk to public health based on conservative assumptions. Furthermore, it may be possible to manage these residues by routine, cost-efficient measures commensurate with the risk and may include a remediation focus on 'touchable' living-space surfaces.

The amount of time spent in public spaces and the low probability of having contact with infected surfaces means the opportunity for exposure in these circumstances is very low. However, the associated high uncertainty of long-term exposure from living in a previously meth-contaminated residence justifies the current established clean up levels.

Consultation with the Colorado Department of Public Health and Environment is recommended before conducting any sampling for methamphetamine contamination in a public facility. An up-to-date list of certified consultants can be found at <https://cdphe.colorado.gov/methlab-cert-lists>.

For more information, visit boco.org/meth.