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# Methamphetamine

This research summary provides a brief overview of methamphetamine, its effects, and the short-term and long-term impact of methamphetamine use. This research summary also provides information about methamphetamine use in Montana.

Methamphetamine is a stimulant that is manufactured with over-the-counter ingredients such as pseudoephedrine, a common ingredient in cold medicines, and other hazardous chemicals such as "acetone, anhydrous ammonia (fertilizer), ether, red phosphorus, and lithium".[1] Methamphetamine can be manufactured in the form of a white or yellowish powder or can be made into a white or clear looking rock that looks like shards of glass.[2] Common names for methamphetamines include crystal, ice, meth, speed, black beauties, crank, glass, and tweak.[2,3]

## How Is Methamphetamine Used?

Methamphetamine can be smoked, injected with a needle, snorted through the nose, or ingested orally. When smoked, methamphetamine reaches the brain within 6-8 seconds, and when injected with a needle, methamphetamine reaches the brain within 10-15 seconds.[4] Smoking or injecting methamphetamine causes the most immediate and intense stimulating effects. These effects are often referred to as a "rush."

While smoking and injecting methamphetamine produce the quickest and most intense euphoric experience, snorting the drug and ingesting it orally are also common. When snorted through the nose, methamphetamine reaches the brain within 3-5 minutes, and when ingested orally, it can take longer (about 3 hours) to reach peak effect because the drug is absorbed through the intestines.[4] The effects produced from snorting or ingesting methamphetamine are less intense, but longer lasting.[5] The short-term effects of using methamphetamine can last up to 12 hours.[4]

## What Are the Effects of Methamphetamine?

Methamphetamine increases levels of the neurotransmitters dopamine, norepinephrine, and serotonin found in the brain.[5,6] These neurotransmitters are known as "feel good" neurotransmitters and are responsible for many essential functions in the body. For example, dopamine is involved in a person's control of their body movements, emotional regulation, motivation, and the reinforcement and regulation of the brain's reward system.[2,7] Norepinephrine is involved in functions such as arousal, memory, the fight/flight response, and mood.[8] Serotonin plays a key role in functions such as a person's circadian rhythm, which impacts the sleep/wake cycle, appetite, and sexual behavior.[7,9]

The short-term stimulating effects of methamphetamine on the body include increased respiration, heartrate, blood pressure, and energy.[12] Increased sexual arousal is also a common short-term physical effect of methamphetamine use.[5] Cognitive and mental health effects include increased alertness and attention, feelings of euphoria and wellbeing, and increased sense of self-esteem.[12] Aggression and violent behavior have also been linked to methamphetamine use.[7,11,15]

The pleasurable experience or "rush" of using methamphetamine is followed by negative effects and symptoms of withdrawal including depression, anxiety, fatigue, intense craving to use the drug again, irritability, poor concentration, hypersomnia, and paranoia.[5,10] This is often referred to as a "crash." To avoid these unpleasant effects of withdrawal, people may be motivated to use the drug again. The cycle of drug use followed by abstinence is often referred to as a "run" or a "binge".[5] Repeated cycles of methamphetamine use can result in tolerance where a person needs to use more of the substance or use more frequently to reach the desired effect. Repeated use and the highly addictive properties of methamphetamine can increase one's risk of developing a substance use disorder.[4]

**Methamphetamine use can also have long-term impacts on a person's physical health, mental health, and cognitive functioning.**[2,4,5,11] Long-term physical health problems include weight loss, damage to the cardiovascular system, pulmonary problems, addiction, malnutrition, sleep difficulties, and dental problems.[4,12] Methamphetamine use also increases the risk of infectious diseases like HIV and hepatitis B and C.[4,12]

Mental health impacts associated with long-term methamphetamine use include problems such as anxiety, difficulty regulating mood, paranoia, hallucinations, and psychosis.[9,13] For example, in one study, McKetin et al. (2006) found that the prevalence of psychosis among a sample of those who used methamphetamine was 11 times higher than among the general population.[14] In another study that sought to measure the health and social consequences of methamphetamine use among young adults, many respondents reported experiencing depression, hallucinations, and paranoia.[11] Suicidal ideation and suicide attempts are also associated with methamphetamine use.[15]

A large body of research done in laboratory animals has documented cognitive deficits and consequences associated with methamphetamine use.[16] In a meta-analysis assessing cognition in people who use methamphetamine, Scott et al. (2007) suggested cognitive deficits associated with methamphetamine use include "problems with episodic memory, executive functions, complex information processing speed, psychomotor skills, attention/working memory, language, and visuoconstruction (i.e., the ability to organize spatial information)".[5] Problems associated with impaired decision making have also been documented.[7] For example, Verdejo-Garcia et al. (2006) found that people who have developed a substance use disorder often make decisions that produce an immediate reward despite subsequent negative consequences.[17] There is also research to suggest that impairment in cognitive functioning persists even when a person has stopped using methamphetamine.[9] Research measuring cognitive performance and impairment from methamphetamine use is complex, and a variety of factors including frequency of use, amount, purity, and route of administration may influence outcomes.

## Methamphetamine Use in Montana

According to the National Survey on Drug Use and Health (2019), approximately 12,900 Montanans aged 12 years and older used methamphetamine in the last year.[18] "Since 2015, methamphetamine use in the past year was significantly higher in the western United States (U.S.) than the rest of the country".[19] The physical, social, and financial costs of methamphetamine use are problematic and concerning for Montana.

- Crimes related to methamphetamine have increase by 100% since 2014.[20]
- $39 million was charged by hospitals across Montana to treat people for stimulant-related admissions and emergency department visits in 2018.[21]
- 1,295 people were admitted to treatment centers across Montana for methamphetamine in 2018-2019 as either their primary, secondary, or tertiary drug of choice.[22]

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