What You Need to Know About "Crystal Meth": An Evidence-Based Review of Methamphetamine Addiction

In recent years, we have observed a massive spike in the illicit use of the incredibly addictive and toxic drug known as Methamphetamine, or, more commonly, "crystal meth." Methamphetamine is an illicit psychoactive stimulant, a category that includes cocaine, amphetamines, MDMA or ecstasy and other drugs.[1] Methamphetamine use is likely on the rise due to its incredible ease of production and the widely available ingredients (e.g. ephedrine and pseudoephedrine) required to produce it. Clandestine labs across the globe support its illicit production, and as the prevalence of abuse of this highly addictive and dangerous drug continues to rise, it is important to educate the world at large about the dangers, risks, side effects (short and long-term), and safest practices from a harm-reduction standpoint.

What is "Crystal Meth" or Methamphetamine?

Methamphetamine, as mentioned before, is in a class of powerful psychoactive stimulants, which include cocaine, MDMA and some others. Meth (short for methamphetamine) is the second most commonly abused drug in the world (after cannabis).[2] A 2014 study found "as many as 52 million individuals aged 15-64 are estimated to have used amphetamine-type stimulants for non-medical purposes at least once in the past year."[2] These figures outnumber cocaine and heroin combined! "Also known as meth, blue, ice, and crystal, among many other terms, it takes the form of a white, odorless, bitter-tasting crystalline powder that easily dissolves in water or alcohol."[3] Later on, we will explore the physiological, psychological, and sociological consequences of repetitive meth abuse.

How Is Methamphetamine Traditionally Used?

There are various different routes of administration (ROA) for methamphetamine, all of which carry their own unique risks and consequences. Many users choose to smoke meth, while others choose to inject the drug directly into their veins. These two routes of administration are the most powerful, due to how rapidly acting they are. When utilizing these two methods of administration, the drug reaches the brain in seconds, causing a powerful "rush" that further reinforces its use. Another common route of administration is intranasal. The obvious complications that arise from this method is damage to the sinus cavity and related areas, and while not as rapid as smoking or injecting the drug, still brings on its effects pretty quickly. Rectal administration, although perhaps not extensively discussed as openly, is also a popular route of administration. In fact, rectal administration of most drugs is generally the closest one can get to intravenous use without actually having to use a needle. The street term for this ROA is commonly referred to as "boofing" or "plugging". The bioavailability of rectally administered drugs is generally very high and close to the near 100% bioavailability of intravenous administration. Finally, methamphetamine can also be consumed orally. This is the slowest (yet safest) ROA, as the drug must bypass first-pass metabolism before it can reach the brain.

Dopaminergic Pharmacology of Methamphetamine in the Brain?

Drugs like speed (amphetamine) and meth are central nervous system stimulants. Methamphetamine affects a wide variety of crucial neurotransmitters, including serotonin, norepinephrine, and, most notably, dopamine.[2] The pharmacology of methamphetamine is characterized by increased concentrations of dopamine being released into the pre-synaptic cleft. Dopamine, being the primary "reward" neurotransmitter, is released in high levels in the brain when meth is consumed, leading to its powerfully reinforcing effects, thus leading to addiction and/or dependence. "Furthermore, MA inhibits transport of dopamine into the storage vesicles, thus increasing the synaptic dopamine concentration."[2] So not only are abnormally high amounts of dopamine being released into the brain (this is what's responsible for the "euphoria"), but meth also blocks the vesicles that absorb the dopamine. This contributes to the powerful feelings of euphoria, the extended mechanism of action, and, perhaps most importantly, it is responsible for the severe neurotoxicity caused by methamphetamine.[2] Returning to a comfortable semblance of normalcy will usually require many months, depending on the duration and intensity of use.[4]

Non-Dopaminergic Effects of Methamphetamine Pharmacology

As mentioned earlier, meth affects many other neurotransmitters besides its acute effects on dopamine. "Methamphetamine produces norepinephrine effects such as mild elevation of pulse and blood pressure and cutaneous vasoconstriction."[2] The latter phenomenon of cutaneous vasoconstriction is why people who use meth often feel cold in their extremities. Another serious issue to consider with methamphetamine, due to how many different neurotransmitters it acts on, is the fact that it can be dangerous when combined with many different types of drugs—especially those with serotonergic action (e.g. tramadol). The resulting pathology of combining drugs like this is called *serotonin syndrome* and can be fatal. Extra special care should be taken when combining any drugs, especially those that may compound each other's effects and produce dangerous results.

How Does Methamphetamine Affect the Human Body?

Meth affects just about every bodily function, from the physiological to the metabolic. A few of the affected systems in the body altered (or arguably damaged) by methamphetamine include breathing, circulation of blood, heart rate, blood pressure, body temperature, cognitive functions, digestion, kidney and bowel function, hearing and vision.[5,6] This is exactly why meth is considered one of the most toxic and dangerous drugs in the world. The various dangers based on the route of administration is absolutely worth noting as well—especially IV administration, which carries with it a host of potential complications and makes it much easier to fatally overdose. As it relates to immunity and infection, a 2014 study found that "new information has recently emerged detailing the devastating effects of METH on host immunity, increasing the acquisition of diverse pathogens and exacerbating the severity of disease."[7] This essentially means that meth weakens the immune system and makes chronic users more susceptible to disease, as well.

A Special Note About Methamphetamine Induced Psychosis

It may not surprise many that chronic meth use is usually accompanied by paranoia, hallucinations, delusions and compulsive behavior. In fact, popular media almost always focuses on this aspect of meth abuse the most. The truth is, they're right. Chronic meth use can induce severe psychosis, to the point where you think the entire world is out to get you or you are being spied on by the feds. A 2009 clinical review states, "Repeated use may induce neurotoxicity, associated with prolonged psychiatric symptoms, cognitive impairment and an increased risk of developing Parkinson's disease."[8] What is quite notable is that chronic methamphetamine use causes architectural and structural changes to the brain. Medical professionals in the Emergency Department should treat serious cases of overdose and psychosis, generally with the use of benzodiazepines.

Harm Reduction Strategies for Meth Abusers Not Interested In Addiction Treatment

While the best option for meth users is to seek treatment and quit using altogether, the reality is tens of millions of people worldwide use this drug. Recovery is a tough road to begin walking at first, and generally requires one to hit what's called "rock bottom" before they're willing to change. Thus, this section will provide a few useful harm reduction tips for those who choose to still use. Since meth impairs judgment and makes one more impulsive, it is crucial to have harm reduction practices in place. The most basic harm reduction advice, although it may seem simple, is to eat, sleep, and drink water. While this may sound obvious to non-meth users, those who abuse meth (especially chronically), understand how difficult this can be. Like any psycho-stimulant, methamphetamine severely reduces appetite and causes dehydration (except it's worse due to the extremely long half life). Often times, users will re-dose when they start to "crash" and stay up for days or even weeks. Meth also has a profound effect on sexual arousal and, as a result, has been strongly implicated in the rise of HIV/AIDS. Having a safety plan in place (e.g. using protection) before using and engaging in sexual activity can be life saving. Obviously, for the injecting meth user, the risks are astronomically higher. The best advice in this case is not to use alone, so someone can help you if you overdose. Proper injection hygiene and practices should be strictly followed as well to avoid infection and even death. Needle exchange programs have shown to be incredibly effective for heroin injecting drug users; the same is very likely true for meth injecting users, as well. And for the methamphetamine addict who chooses to continue to use or feels unable to stop, the value of counseling and therapy certainly shouldn't be understated, either.

Addiction Recovery From Long-Term Meth Abuse is Slow, But Possible

The powerfully significant effects of methamphetamine on the brain and our neurobiology are rather severe, and thus, healing and returning to a sense of "normalcy" requires incredible patience and time. A 2003 study stated that "heavy daily MA use and high dosages over a long duration result in neurobiological deficits that do not resolve until ***many months*** following cessation of use."[4]However, it is important to note that the acute withdrawal symptoms of irritability, sleep disturbance, and fatigue start to fade in 7-10 days. However, long-term users generally experience PAWS (post-acute withdrawal syndrome), which takes time to heal from. The moral of this story is that recovery is possible with patience, perseverance and diligence. If you or a loved one is struggling with methamphetamine or drug addiction, reach out to our clinical team at EvolveIndy.com to setup a free consultation today.

Meth is Making a Comeback Due to the Opioid Crisis Stealing the Spotlight

"A recent editorial in the *Lancet* stated that the shift in public-health priorities to opioids in the last few years in the United States has enabled the METH market to flourish; as a result, this market is primed for resurgence. Accordingly, drug control may be more challenging than anticipated as a second 'METH wave' begins."[9] This is certainly a scary thought and one that demands attention and awareness. The incredibly easy procedure to make meth and the widely available ingredients has truly made this a global epidemic. The product is becoming increasingly more available, far more potent than in the past, and is very inexpensive. This is unfortunately the perfect recipe for disaster. This biologist and author believes further clinical and epidemiological research into the resurgence of meth abuse is crucial to help quell this epidemic.

Where do we go from here?

Clearly, methamphetamine use has reached epidemic proportions around the globe, with the greatest increase of use by 400% in Iran.[10] There is a dire need to address this situation on a global scale, and it should certainly begin with better access to quality education and clinical and support services. Chronic meth addicts may suffer from extreme paranoia, thus making it hard for clinicians to develop a successful rapport with their patients. Being compassionate, understanding and non-judgmental towards a meth addict's situation is generally crucial for real therapy to commence. Currently, no effective pharmacological interventions exist to treat meth addiction (unlike opioids, in which methadone and suboxone are available drugs used to prevent relapse and help patients transition off illicit drugs). The need for further research and the development of new and efficacious strategies is now more important than ever to battle this crisis.

If you or a loved one is struggling with meth addiction or other substance abuse issues, please reach out to our team at EvolveIndy.com to setup a free consultation today.

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