

# Methamphetamines: Madness to Method



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## Crystal MA Facts...

1. Other names for crystal methamphetamines (MA) include:  
Speed, chalk, ice, yellow crystals, jib and glass
2. Ingredients/raw materials include:  
pseudoephedrine, acetone, lithium batteries, paint thinner and others
3. It is structurally similar to amphetamines and other stimulants and it affects the release of serotonin, norepinephrine and dopamine
4. The half-life of MA is 12 hours, but its effects can last between eight hours and 24 hours
5. MA can be detected in urine for up to two to three days
6. It is metabolized by cytochrome P450 isoenzymes

## Point #1

Methamphetamine (MA)-induced psychosis is characterized by:

- paranoia,
- visual hallucinations and
- auditory hallucinations (Table 1).

The rate of psychosis, due to MA, is approximately 76% to 92%. Hallucinations and paranoid delusions usually disappear within a month after discontinuing drug use; however, residual psychotic symptoms can last more than six months.

Acute psychotic symptoms are treated with neuroleptics and hospitalization. For those patients who experience psychosis, it may recur more easily after:

- long periods of abstinence,
- if they return to using MA or other psychoactive drugs or
- if they are exposed to non-specific stimuli.

## Zach's Hallucinations

- Zach began injecting approximately 40 mg of MA at the age of 22. After each injection, he was able to concentrate better and he felt stimulated.
- At the age of 23, Zach began injecting several times a day because it highly enhanced his sexual sensations.
- At the age of 24, he began to hear voices. At this time, he was unsure if the voice was an illusion or real.
- By the age of 25, Zach experienced auditory hallucinations after every MA injection. The voice told him that his wife was having an affair and that he should kill her.
- At the age of 27, Zach was arrested and jailed.
- In prison, despite complete abstinence from MA, his hallucinations reappeared.
- A year later, after being released from prison, his hallucinations have not yet disappeared even though he has not reused MA.
- Zach began complaining that someone was trying to attack him and that someone was poisoning his food.
- He was arrested again, but a urine test in police custody did not detect MA.

## Patterns of use of MA...

- MA can be used through:
  - Injection (instantaneous rush)
  - smoking (instantaneous rush)
  - snorting (euphoria within five minutes)
  - ingesting (euphoria within 15 minutes to 20 minutes)
- There is a binge and crash pattern associated with MA use
- The first time addiction rate of MA is 85% and according to the national average in the US, only five per cent recover<sup>3</sup>

## Point #2

There are various factors that can affect the risk of MA-induced psychosis. The onset of psychosis from initial use varies and is dependent on the dose, the frequency, the route of administration and by individual characteristics.

Wada *et al* suggest that five years of MA use is a turning point for the frequency of symptom occurrence, such as:

- auditory hallucinations,
- irritability,
- delusions of persecution and
- suspicion.<sup>1</sup>

Sato *et al* showed that the risk of psychosis rises steeply when the duration of MA use exceeds six months.<sup>2</sup>

Furthermore, it has also been found that the greater the familial loading for schizophrenia, the more likely a MA user is to develop psychosis and the longer that psychosis is likely to last.<sup>4</sup> About 26% of psychosis patients had a positive family history of schizophrenia and only 5.9% of the dependent patients had a positive family history.<sup>5</sup> MA users who developed psychosis were younger at first use, used larger amounts and had higher rates of premorbid schizoid and schizotypal trait scores.<sup>6</sup>

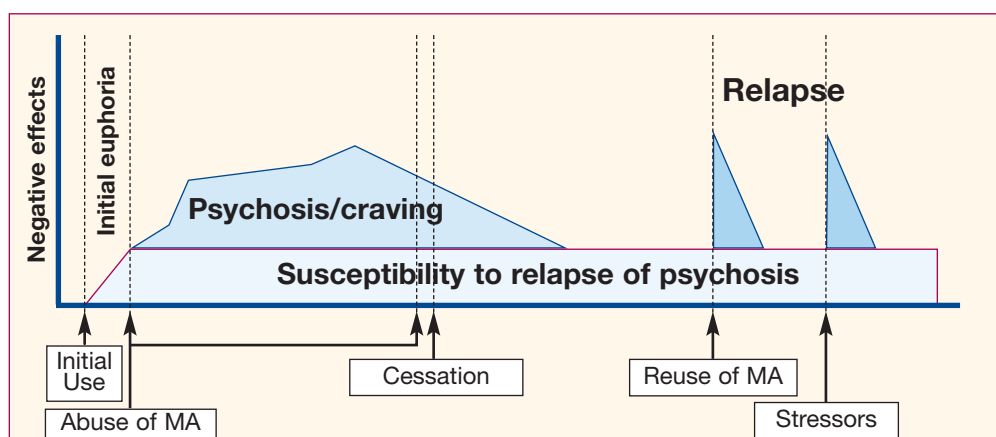


Figure 1. Pathophysiology and timeline of MA use/abuse.



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**MA withdrawal...**

- Withdrawal from MA can occur within 24 hours of the last use and can last from two days to several months<sup>7</sup>
- Symptoms resemble major depressive disorders. These symptoms include:
  - Depression
  - Fatigue
  - Excessive sedation
  - Irritability
- The user will experience intense cravings for the drug and will become suicidal

**Point #3**

Individuals with a history of MA psychosis occasionally develop spontaneous recurrences of MA psychosis (*i.e.*, paranoid hallucinatory states known as flashbacks) in response to stress (*i.e.*, mild psychosocial stress) after the pharmacological effects of the drug have worn off and long after MA has been excreted from the urine (Figure 1).

Flashbacks exhibit psychotic symptoms that are almost identical to the user's previous MA psychosis after periods of normalcy.

Flashbacks are commonly triggered by a fear of other people and by a fear of confrontation with others. They may persist for weeks or months after the user's last drug experience. In a control group of 87 subjects, 82% continued to experience flashbacks for more than one to two years and of these 82% subjects, 35% (53 subjects)

experienced flashbacks for one and a half years to four years.<sup>8</sup>

Yiu *et al* showed that 18 people out of 110 people that abused MA (*i.e.*, approximately one to 10 injections per day) with a 30 mg to 60 mg injection during their period of abuse, experienced flashbacks.<sup>9</sup> These flashbacks were characterized by transient auditory and visual hallucinations. The auditory hallucinations lasted two minutes to 10 minutes and occurred three to five times per day in seven of the 18 people who experienced flashbacks and lasted for two to three hours in nine of the 18 cases. The visual hallucinations occurred sporadically, ranging from daily flashbacks to flashbacks that occurred a few times a week. The paranoid delusions abated over three days to 282 days.

**Table 1****Signs and symptoms of MA use from crystal meth addiction****Initial use**

- Rush or flash
- Euphoria
- Alertness, high energy level
- Increased concentration

**Chronic use**

- Irritability
- Aggressive behaviour
- Auditory/ visual hallucinations
- Paranoid delusions
- Deterioration in personal interactions

**Point #4**

MA use results in the release of large amounts of dopamine and smaller amounts of norepinephrine. It causes neurodegeneration in the dopamine and serotonin nerve terminals and changes in brain metabolism (*i.e.*, reduced aerobic glycolytic activity) (Figure 2). Decreased striatal metabolism could reflect long-lasting changes in DA cell activity and decreases in nucleus accumbens could account for

the persistence of amotivation and anhedonia. Flashbacks may involve post traumatic stress disorder-related mechanisms.

Researchers report that as much as 50% of the dopamine producing cells in the brain are damaged after prolonged exposure to relatively low levels of MA. Light-colored spots on brain scans show areas of dead tissue, indicating a swiss cheese brain incapable of normal function.

*Researchers report that as much as 50% of the dopamine producing cells in the brain are damaged after prolonged exposure to relatively low levels of MA.*

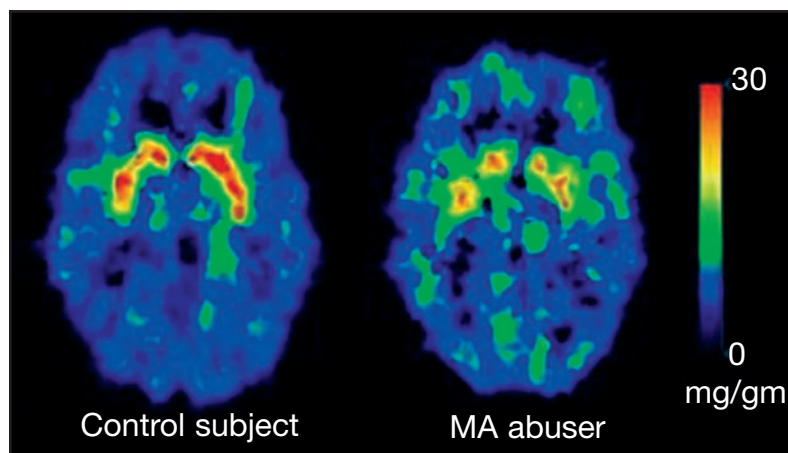


Figure 2. Positron emission tomography scan normal vs. methamphetamine abuser 80 days after detoxification.<sup>11</sup>

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## Resources

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