Drug twists brain and body

Crystal meth (crystal methamphetamine) goes by several other names, including the following:

- tina
- ice
- meth
- crystal

Because it is part of the amphetamine group of drugs, crystal meth has a stimulating effect and, like all amphetamines, can affect the heart and cardiovascular system, causing the following complications:

- rapid heart beats
- high blood pressure
- short, rapid breaths
- feeling hot

Repeated, regular use of crystal meth (bingeing) can cause inflamed blood vessels and heart damage. All of this can lead to other complications, including strokes and high blood pressure. These complications have been noted in relatively young people not normally at risk for cardiovascular disease but who became at risk due to exposure to crystal meth.

Kidneys and muscles

Crystal meth has also been found to cause muscle breakdown, leading to kidney damage. In one study of people who sought help from the Emergency departments of California hospitals, researchers found that 43% of patients with muscle breakdown and kidney damage had crystal meth in their urine samples.

Infection and immunity

In laboratory experiments, crystal meth appears to weaken a key group of cells of the immune system, CD8+ cells. They are responsible for fighting infections, including HIV.

In one study, long-term use of crystal meth was associated with an increase in gum disease. The stimulation and agitation caused by crystal meth was likely responsible for participants in that study having partially worn down their teeth by clenching and grinding their jaws.

No regulation

Because regulatory agencies do not monitor or assess the production, purity and safety of crystal meth, it is not surprising that batches of this drug can be contaminated with other compounds. The production of crystal meth is a toxic affair and lead poisoning has been reported in some users.

Juggling drugs

Crystal meth and chemically related compounds such as ecstasy are broken down by enzymes in the intestine and liver. Two classes of anti-HIV medications are also processed by these same enzymes:

- protease inhibitors (PIs)
- non-nukes (non-nucleoside reverse transcriptase inhibitors)

When two different compounds are processed simultaneously through the same enzyme, levels of one or both drugs can either rise or fall, leading to increased side effects or drug resistance. In the case of crystal meth, PIs and non-nukes have the potential to increase levels of this drug to very high levels. At least one person has died because of this interaction.
Crystal on the brain
Perhaps the most disturbing and obvious impact of long-term exposure to crystal meth is its many effects on the brain. Experiments on rats suggest that the concentration of crystal meth in the brain is about 10 times greater than that found in the blood after the animals have been given the drug. In people, crystal meth appears to last a relatively long time, with 50% of the drug being detectable 12 hours after a dose was taken. These findings suggest that meth concentrates in the brain and likely lasts a relatively long time in this organ. Thus the brain may bear the brunt of crystal meth’s toxic effects.

Cells in the brain use compounds called neurotransmitters, including serotonin and dopamine, to send signals to each other. These compounds also play a role in many functions, including memory, mood, muscle control and learning.

In one study of 15 HIV negative, long-term crystal meth users, researchers scanned their brains with hi-tech PET scanners. The scans revealed less-than-normal levels of molecules used to move the neurotransmitter dopamine to cells. This likely reduced the ability of brain cells to get access to dopamine and possibly affected their ability to store and retrieve information as well as control muscles. Not surprisingly, further research found that the participants had difficulty learning and coordinating the movement of their muscles.

HIV and crystal meth
Based on the results of test-tube and animal experiments, some researchers suggest that crystal meth has the potential to make HIV-related brain damage worse. Possibly, the mixture of crystal meth and toxic proteins produced by HIV could increase the risk of AIDS-related problems involving clear thinking and memory. But long-term studies of HIV positive crystal meth users are needed to confirm this theory.

Crystal enters the body
There are many ways in which this substance can enter the body. Crystal meth can be:

- snorted
- swallowed
- injected into blood vessels
- squirted into the rectum

Depending on which method is chosen, the high from crystal meth can occur anywhere from one to 20 minutes after the drug is taken. Initially, users have reported the following feelings:

- a heightened sense of alertness
- euphoria
- an increased sense of well-being and confidence

But doctors have also observed other, less glamorous effects of crystal meth in users, such as:

- personality changes
- restlessness
- tension
- irritability
- problems falling asleep
- loss of appetite
- unintentional weight loss
- verbally threatening and sometimes physically aggressive behaviour

Because 50% of crystal meth leaves the body within 12 hours of being taken, its pleasurable effects can wane within this time frame. Users often take another hit of the drug to avoid the following symptoms of withdrawal:

- depression
- lack of energy
- loss of pleasure from everyday activities
- thoughts of suicide
The downward spiral
Continued use of crystal meth over several days can lead to an “extremely irritable and paranoid state,” according to researchers. What’s more, in about 10% of long-term users, exposure to this drug can lead to a state of psychosis with the following features:

- feelings of paranoia
- disconnection from reality
- intense hallucinations

Recovery
Crystal meth users who enter treatment programs appear to recover from some effects of this drug. For instance, in a study of 170 crystal meth users, 23% reported feelings of paranoia when they entered a treatment program. Between two and five years after completing the program, only 7% still had feelings of paranoia.

Sadly, 62% of 170 participants were depressed when they entered the program and the same proportion remained depressed when they left. And 28% of participants reported violent behaviour in the year after they had left the program, according to the research team. Overall, these findings suggest that crystal meth exposure can cause lasting damage in some people.

Crystal meth impairs the brain’s ability to make and possibly use the neurotransmitter dopamine, and HIV appears to damage dopamine-producing parts of the brain. Some doctors who treat people with HIV/AIDS (PHAs) recovering from meth addiction have found the antidepressant bupropion (Wellbutrin, Zyban) useful for managing depression in their patients. Because antidepressants take weeks or even months to begin to work, these drugs are not suitable for treating withdrawal from substance use. Many other compounds are being tested for their anti-addiction effects in crystal meth users, including anti-schizophrenia medicines. And, of course, medication(s) are used together with different forms of counseling, 12-step programs and harm reduction messages to help people begin the process of healing and recovering their lives from substance use.

REFERENCES:


Created on: 2005 June 6

Author: Hosein SR
Disclaimer

Decisions about particular medical treatments should always be made in consultation with a qualified medical practitioner knowledgeable about HIV- and hepatitis C-related illness and the treatments in question.

CATIE provides information resources to help people living with HIV and/or hepatitis C who wish to manage their own health care in partnership with their care providers. Information accessed through or published or provided by CATIE, however, is not to be considered medical advice. We do not recommend or advocate particular treatments and we urge users to consult as broad a range of sources as possible. We strongly urge users to consult with a qualified medical practitioner prior to undertaking any decision, use or action of a medical nature.

CATIE endeavours to provide the most up-to-date and accurate information at the time of publication. However, information changes and users are encouraged to ensure they have the most current information. Users relying solely on this information do so entirely at their own risk. Neither CATIE nor any of its partners or funders, nor any of their employees, directors, officers or volunteers may be held liable for damages of any kind that may result from the use or misuse of any such information. Any opinions expressed herein or in any article or publication accessed or published or provided by CATIE may not reflect the policies or opinions of CATIE or any partners or funders.

Information on safer drug use is presented as a public health service to help people make healthier choices to reduce the spread of HIV, viral hepatitis and other infections. It is not intended to encourage or promote the use or possession of illegal drugs.

Permission to Reproduce

This document is copyrighted. It may be reprinted and distributed in its entirety for non-commercial purposes without prior permission, but permission must be obtained to edit its content. The following credit must appear on any reprint: This information was provided by CATIE (the Canadian AIDS Treatment Information Exchange). For more information, contact CATIE at 1.800.263.1638.

© CATIE

Production of this content has been made possible through a financial contribution from the Public Health Agency of Canada.

Available online at: