

'Flakka': A low-cost, dangerous high

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Use of α -pyrrolidinovalerophenone (α -PVP), a psychostimulant related to cathinone derivatives ("bath salts"), has been reported in the United States, especially in Florida.¹ Known by the street names "flakka" or "gravel," α -PVP is inexpensive, with a single dose (typically 100 mg) costing as little as \$5.² Alpha-PVP can be consumed via ingestion, injection, insufflation, or inhalation in vaporized forms, such as E-cigarettes, which deliver the drug quickly into the bloodstream and can make it easy to overdose.¹ The low cost of this drug makes it likely to be abused. Here we review the mechanism of action and effects of α -PVP and summarize treatment options.

Mechanism of action

Alpha-PVP is a structural parent of 3,4-methylenedioxypyrovalerone (MDPV)—the first widely abused synthetic cathinone.³ Much like cocaine, α -PVP stimulates the CNS by acting as a potent dopamine and norepinephrine reuptake inhibitor. However, unlike cocaine, it lacks any action on serotonin transporters. The pyrrolidine ring in MDPV and α -PVP is responsible for the highly potent dopamine reuptake inhibitor action of these agents.³

A wide range of adverse effects

Use of α -PVP results in a state of "excited delirium," with symptoms such as hyperthermia, hallucinations, paranoia, violent aggression, and self-harm.¹ Alpha-PVP is known to cause rhabdomyolysis.⁴ Some studies have reported cardiovascular effects, such as arterial hypertension, palpitations, dyspnea, vasoconstriction,

arrhythmia, myocardial infarction (MI), and myocarditis.⁵ Alpha-PVP also may result in neurologic symptoms, including headache, mydriasis, lightheadedness, paresthesia, seizures, dystonic movements, tremor, amnesia, dysgeusia, cerebral edema, motor automatisms, muscle spasm, nystagmus, parkinsonism, and stroke.⁵ Death may occur by cardiac arrest, renal damage, or suicide.

Case reports. The effects of α -PVP have been documented in the literature:

- A 17-year-old girl was brought to an emergency department in Florida with acute onset of bizarre behavior, agitation, and altered mental status. It took 6 days and repeated administrations of olanzapine and lorazepam for the patient to become calm, alert, and oriented.²
- ST-elevated MI with several intracardiac thrombi was reported in a 41-year-old woman who used α -PVP.⁴
- In 2015, 18 deaths related to α -PVP use were reported in South Florida.⁵
- Deaths related to α -PVP use also have been reported in Japan and Australia.⁵



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Treatment options

There are no treatment guidelines for α -PVP-related psychiatric symptoms. Case reports describe remission of symptoms following aggressive treatment with antipsychotics and benzodiazepines.² Guidelines for treatment of stimulant-induced behavioral and psychotic symptoms⁶ may be considered for patients who have used α -PVP.

Reassurance and supportive care are the basic principles of such interventions. A quiet environment and benzodiazepines may provide relief of agitation. Antipsychotics may be helpful if a patient exhibits psychotic symptoms.

Similar drugs may emerge

In 2014, the DEA classified α -PVP as a Schedule I substance. Laws against the import of such substances via the Internet or other means also may help control the spread of this drug. However, chemically similar drugs

that may elude drug screens are continually emerging. The lack of evidence-based guidelines on recognizing and managing intoxication, withdrawal, and long-term effects of α -PVP and other “designer drugs” calls for greater research in this emerging area of substance use disorders.

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Consider benzodiazepines and antipsychotics to manage α -PVP-related agitation and psychosis