

## Club Drugs (GHB, Ketamine, and Rohypnol)

Club drugs are a pharmacologically heterogeneous group of psychoactive drugs that tend to be abused by teens and young adults at bars, nightclubs, concerts, and parties. Gamma hydroxybutyrate (GHB), Rohypnol, ketamine, as well as MDMA (ecstasy) and methamphetamine (which are featured in separate *InfoFacts*) are some of the drugs included in this group.

GHB (Xyrem) is a central nervous system (CNS) depressant that was approved by the Food and Drug Administration (FDA) in 2002 for use in the treatment of narcolepsy (a sleep disorder). This approval came with severe restrictions, including its use *only* for the treatment of narcolepsy, and the requirement for a patient registry monitored by the FDA. GHB is also a metabolite of the inhibitory neurotransmitter gamma-aminobutyric acid (GABA). It exists naturally in the brain, but at much lower concentrations than those found when GHB is abused.

- Rohypnol (flunitrazepam) use began gaining popularity in the United States in the early 1990s. It is a benzodiazepine (chemically similar to sedative-hypnotic drugs such as Valium or Xanax), but it is not approved for medical use in this country, and its importation is banned.

- Ketamine is a dissociative anesthetic, mostly used in veterinary practice.

### How Are Club Drugs Abused?

- GHB and Rohypnol are available in odorless, colorless, and tasteless forms that are frequently combined with alcohol and other beverages. Both drugs have been used to commit sexual assaults (also known as "date rape," "drug rape," "acquaintance rape," or "drug-assisted" assault) due to their ability to sedate and incapacitate unsuspecting victims, preventing them from resisting sexual assault.
- GHB is usually ingested orally, either in liquid or powder form, while Rohypnol is typically taken orally in pill form. Recent reports, however, have shown that Rohypnol is being ground up and snorted.
- Both GHB and Rohypnol are also abused for their intoxicating effects, similar to other CNS depressants.
- GHB also has anabolic effects (it stimulates protein synthesis) and has been used by bodybuilders to aid in fat reduction and muscle building.
- Ketamine is usually snorted or injected intramuscularly.

## How Do Club Drugs Affect the Brain?

- GHB acts on at least two sites in the brain: the GABA<sub>B</sub> receptor and a specific GHB binding site. At high doses, GHB's sedative effects may result in sleep, coma, or death.
- Rohypnol, like other benzodiazepines, acts at the GABAA receptor. It can produce anterograde amnesia, in which individuals may not remember events they experienced while under the influence of the drug.
- Ketamine is a dissociative anesthetic, so called because it distorts perceptions of sight and sound and produces feelings of detachment from the environment and self. Ketamine acts on a type of glutamate receptor (NMDA receptor) to produce its effects, which are similar to those of the drug PCP.<sup>1,2</sup> Low-dose intoxication results in impaired attention, learning ability, and memory. At higher doses, ketamine can cause dreamlike states and hallucinations; and at higher doses still, ketamine can cause delirium and amnesia.

### **Addictive Potential**

- Repeated use of GHB may lead to withdrawal effects, including insomnia, anxiety, tremors, and sweating. Severe

withdrawal reactions have been reported among patients presenting from an overdose of GHB or related compounds, especially if other drugs or alcohol are involved.<sup>3</sup>

- Like other benzodiazepines, chronic use of Rohypnol can produce tolerance, physical dependence, and addiction.
- There have been reports of people binging on ketamine, a behavior that is similar to that seen in some cocaine- or amphetamine-dependent individuals. Ketamine users can develop signs of tolerance and cravings for the drug.<sup>4</sup>

## What Other Adverse Effects Do Club Drugs Have on Health?

Uncertainties about the sources, chemicals, and possible contaminants used to manufacture many club drugs make it extremely difficult to determine toxicity and associated medical consequences. Nonetheless, we do know that:

- Coma and seizures can occur following use of GHB. Combined use with other drugs such as alcohol can result in nausea and breathing difficulties. GHB and two of its precursors, gamma butyrolactone (GBL) and 1,4 butanediol (BD), have been involved in poisonings, overdoses, date rapes, and deaths.

- Rohypnol may be lethal when mixed with alcohol and/or other CNS depressants.
- Ketamine, in high doses, can cause impaired motor function, high blood pressure, and potentially fatal respiratory problems.

## What Treatment Options Exist?

There is very little information available in the scientific literature about treatment for persons who abuse or are dependent upon club drugs.

- There are no GHB detection tests for use in emergency rooms, and as many clinicians are unfamiliar with the drug, many GHB incidents likely go undetected. According to case reports, however, patients who abuse GHB appear to present both a mixed picture of severe problems upon admission and a good response to treatment, which often involves residential services.<sup>3</sup>
- Treatment for Rohypnol follows accepted protocols for any benzodiazepine, which may consist of a 3- to 5-day inpatient detoxification program with 24-hour intensive medical monitoring and management of withdrawal symptoms, since withdrawal from benzodiazepines can be life-threatening.<sup>3</sup>

- Patients with a ketamine overdose are managed through supportive care for acute symptoms, with special attention to cardiac and respiratory functions.<sup>5</sup>

## How Widespread Is Club Drug Abuse?

### *Monitoring the Future Survey<sup>†</sup>*

MTF has reported consistently low levels of abuse of these club drugs since they were added to the survey. For GHB and ketamine, this occurred in 2000; for Rohypnol, 1996. According to results of the 2009 MTF survey, 0.7 percent of 8th-grade and 1.1 percent of 12th-grade students reported past-year<sup>††</sup> use of GHB, a statistically significant decrease from peak-year use of 1.2 percent in 2000 for 8th-graders and 2.0 percent for 12th-graders in 2004. GHB use among 10th-grade students was reported at 1.0 percent, an increase from 2008 (0.5 percent), and statistically unchanged from peak use of 1.4 percent in 2002 and 2003.

Past-year use of ketamine was reported by 1.0 percent of 8th-graders, 1.3 percent of 10th-graders, and 1.7 percent of 12th-graders in 2009. These percentages also represent significant decreases from peak years: 2000 for 8th-graders (at 1.6 percent) and 2002 for 10th- and 12th-graders (at 2.2 and 2.6 percent, respectively).

For Rohypnol, 0.4 percent of 8th- and 10th-graders, and 1.0 percent of 12th-graders reported past-year use, also down from peak use in 1996 for 8th-graders (1.0 percent), 1997 for 10th-graders (1.3 percent), and 2002 and 2004 for 12th-graders (1.6 percent).

## Other Information Sources

For more information about club drugs, visit [www.clubdrugs.gov](http://www.clubdrugs.gov), [www.teens.drugabuse.gov](http://www.teens.drugabuse.gov), and [www.backtoschool.drugabuse.gov](http://www.backtoschool.drugabuse.gov); or call NIDA at 877-643-2644. For street terms searchable by drug name, street term, cost and quantities, drug trade, and drug use, visit <http://www.whitehousedrugpolicy.gov/streetterms/default.asp>.

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### Data Sources

<sup>†</sup> These data are from the 2009 Monitoring the Future survey, funded by the National Institute on Drug Abuse, National Institutes of Health, Department of Health and Human Services, and conducted annually by the University of Michigan's Institute for Social Research. The survey has tracked 12th-graders' illicit drug use and related attitudes since 1975; in 1991, 8th- and 10th-graders were added to the study.

<sup>††</sup> "Lifetime" refers to use at least once during a respondent's lifetime. "Past year" refers to use at least once during the year preceding an individual's response to the survey. "Past month" refers to use at least once during the 30 days preceding an individual's response to the survey.

### Resources

<sup>1</sup> Anis NA, Berry SC, Burton NR, Lodge D. The dissociative anaesthetics, datamine and phencyclidine, selectively reduce excitation of central mammalian neurons by N-methyl-aspartate. *Br J Pharmacol* 79(2): 565–575, 1983.

<sup>2</sup> Kapur S, Seeman P. NMDA receptor antagonists ketamine and PCP have direct effects on dopamine D2 and serotonin 5-HT2 receptors – Implications for models of schizophrenia. *Molecular Psychiatry* 7: 837–844, 2002.

<sup>3</sup> Maxwell JC, Spence RT. Profiles of club drug users in treatment. *Subst Use Misuse* 40(9–10):1409–1426, 2005.

<sup>4</sup> Jansen KL, Darracot-Cankovic R. The nonmedical use of ketamine, part two: A review of problem use and dependence. *J Psychoactive Drugs* 33(2):151–158, 2001.

<sup>5</sup> Smith KM, Larive LL, Romanelli F. Club Drugs: Methylenedioxymethamphetamine, flunitrazepam, ketamine hydrochloride, and  $\gamma$ -hydroxybutyrate. *Am J Health-Syst Pharm* 59(11):1067–1076, 2002.