MODULE NINE

Club Drug Use and HIV/AIDS

Overview of the Club Drug Epidemic

The information in this section was excerpted from the following source:
Gorman, M., & Halkitis, P. (2003). Methamphetamine and Club Drug Use and HIV. *Focus: A Guide to AIDS Research and Counseling*, 18(7), 5-6.

- The use of "club drugs"—methamphetamine, Ecstasy (MDMA), gamma hydroxybutyrate (GHB), ketamine, and poppers (amyl nitrites)—has increased dramatically since the early 1990s with the spread of circuit parties and raves, and the re-emergence of sex clubs. The use of these substances in sexually charged environments creates a psychological, sociological, and biological environment that threatens individual and public health.

- Club drugs commonly place gay and bisexual men at greater risk for HIV seroconversion by increasing the likelihood of unprotected anal intercourse, in particular, because of their strong association with sexually charged venues such as bars, dance clubs, and commercial public sex environments.

- Gay men often identify substance use as a major cause of unprotected sex and as an important element of their lives (Gorman, et al. 1997; Gorman & Carroll, 2000). In a New York sample, participants reporting more substance use were more likely to engage in unprotected oral and anal sex—both insertive and receptive—than those reporting less substance use (Halkitis & Parsons, 2002). Men consistently reporting unprotected anal sex also reported a higher frequency of drug use during sex than those who always reported protected anal intercourse. Finally, the relationship between drug use and risky sexual behaviors is mediated by partner type—for example, primary or anonymous partner, and HIV-positive or HIV-negative partner—which may increase or reduce the risk of HIV transmission and the frequency of unprotected sex.

- Project SURE, a University of Washington and San Jose State University study, found a high prevalence of club drug use in tandem with unsafe sexual practices in Seattle and San Jose, California (Gorman, et al., 1997; Gorman & Carroll, 2000; Gorman, 2003; Gorman, 1996; Gorman, Morgan & Lambert, 1995). Many Project SURE respondents reported that they "medicated" their HIV symptoms through substance use. Many said that club drug use reduced sexual inhibitions and allowed them to engage in activities in which they would not otherwise engage. Respondents reported frequent sex with multiple partners, widespread drug injection,

and virtually nonexistent communication between anonymous participants, particularly at clubs and baths. Studies in the New York metropolitan area uncovered similar findings (Halkitis & Parsons, 2002; Parsons & Halkitis, 2002). Preliminary data from NYU's Project BUMPS—a cohort of 450 club drug-using men who have sex with men—suggest that club drug use for coping as well as for ameliorating feelings of depression and loneliness appears closely linked to sexual risk taking.

- Club drug use among men who have sex with men and the complex interaction between use of these substances and physical and mental health require programs that holistically address the user. Further, culturally sensitive programs must link clients to HIV screening and treatment, substance abuse treatment, including relapse prevention and harm reduction programs, and mental health treatment.

- Five recommendations made by Project SURE staff may help enhance program efficacy. First, club drug use is not an isolated fad, but a serious public health threat. Train staff and develop targeted programs and consider developing partnerships with agencies and individuals where expertise in these areas already exists.

- Second, ask clients about club drug use and further assess clients for club drug use and effects, noting physical and psychological signs, and undertaking a short drug and alcohol history, and brief, periodic mental status exams, paying particular attention to alterations in thought processes and speech patterns.

- Third, recognize and treat dual diagnosis (substance use and psychiatric disorders): clients with undiagnosed psychiatric problems are vulnerable to substance use and addiction, either because of impaired judgment or as a means to self-medicate psychological symptoms. Be alert to emotional reactions to changes in HIV status or HIV disease progression and to the potential for clients to use methamphetamines to block these reactions. Finally, to

  avoid self-medication with methamphetamines, monitor prescription drug use for effectiveness in the treatment of fatigue, pain, and psychological symptoms.

- Fourth, educate clients about the health effects of all medications and drugs, including behavioral disinhibition that may lead to HIV transmission. Explore with clients the ways in which recreational drug use may increase risks to individual and community health, and undermine physical and mental health. Screen clients on HIV medications about substance use and its impact on treatment adherence.

- Fifth, maintain a focus on the whole person— if possible, including members of his or her support system in care—and offer clients appropriate and culturally sensitive referrals. All of these approaches are crucial to employ at a time when recreational drug use and sexual risk characterize the lives of many gay and bisexual men.

Methamphetamine and HIV/AIDS

The information in this section was excerpted from two sources:

Jones, K. (2005). Methamphetamine, the Brain, HIV, and Mental Health. *Focus: A Guide to AIDS Research and Counseling*, 20(6), 1-4.

Colfax, G., & Shoptaw, S. (2005). The Methamphetamine Epidemic: Implications for HIV Prevention and Treatment. *Current HIV/AIDS Reports*, 2, 194–199.

1. Introduction

- Recreational methamphetamine use is expanding among members of gay communities in the United States. Understanding the drug's mechanism of action and the short- and long-term psychiatric consequences of abuse offers insights into how methamphetamine affects HIV transmission behaviors among both HIV-positive and HIV-negative people, how it affects treatment-related behaviors such as adherence in people with HIV, and how it complicates the course of HIV disease.

- Methamphetamine is classified as a stimulant (an amphetamine). Other drugs in this class include cocaine and MDMA (methylenedioxymethamphetamine; Ecstasy) and medications such as methylphenidate (Ritalin). Each of these drugs has unique effects on the brain and behavior. Methamphetamine can be thought of as a super-concentrated amphetamine in the same way that "crack" is a concentrated form of cocaine.

- Colloquially known as "crystal," "tina," "meth," or "speed," methamphetamine can be smoked, snorted, injected, or ingested. Some users report "booty bumping," inserting a solution of methamphetamine and water rectally with a syringe causing decreased sensation in the rectum—"freezing"—and some absorption of the drug. Methamphetamine is used for longer and more aggressive sexual encounters.

2. Prevalence of Methamphetamine Use

- Methamphetamine use is disproportionately represented among populations at risk for HIV and infected with HIV. Among men who have sex with men (MSM), prevalence of use of methamphetamine and other amphetamine-type stimulants is approximately 10 times higher than in the general population, although heavy use (>weekly) is reported by a minority of MSM who use methamphetamines (Colfax, Vittinghoff & Husnick, 2004; Stall, et al., 2001).

- Among persons with HIV infection in clinical care, methamphetamine use is also high; a recent clinic-based survey of persons with HIV found that 40% of MSM, 30% of heterosexual men, and 19% of women reported methamphetamine use in the prior year (Mitchell, et al., 2004).

3. Mechanisms for Methamphetamine Use

- The psychiatric and behavioral effects of methamphetamine are mediated primarily through the release of two neurotransmitters: large amounts of dopamine, one of the brain's key neurotransmitters, and smaller amounts of norepinephrine. Methamphetamine addiction can be understood as a two-part phenomenon: during intoxication, there is too much dopamine, and during withdrawal there is too little. It can take months or years to recover to normal dopamine levels, and sometimes normal levels are never attained.

- Dopamine acts in regions of the brain that affect the experience of pleasure, such as subjective sensations of euphoria, wellbeing, sexual desire, and confidence. It also influences the body's sleep clock. Further, dopamine is involved in reward behavior, the mechanism that causes people to repeat behaviors that are pleasurable. Most neurochemical models of addiction focus on this role of dopamine as a behavioral reinforcer, and addiction to most drugs, including heroin and tobacco, relies on dopamine to reinforce the substance's pleasurable effects.

4. Medical Consequences of Methamphetamine Use

- Psychologic effects of methamphetamine begin with euphoria, behavioral disinhibition, and goal-directed behavior, and escalate to anxiety, insomnia, hypervigilance, paranoia, and often persecutory delusions that are indistinguishable acutely from paranoid schizophrenia (Sekine, et al., 2001).

- After months or years of methamphetamine abuse, the brain's supply of dopamine is probably depleted, resulting in depression, emotional flattening, and anhedonia. Researchers believe that methamphetamine can cause brain damage, because the drug pushes out huge amounts of dopamine from nerve cells. This flooding can be toxic to nerve cells and to the whole group of cells where dopamine is clustered and stored in the brain.

- New research published by Jernigan and his colleagues (2005) indicates that methamphetamine abuse and HIV infection cause significant alterations in the size of certain brain structures, and in both cases the changes may be associated with impaired cognitive functions, such as difficulties in learning new information, solving problems, maintaining attention and quickly processing information. Co-occurring methamphetamine abuse and HIV infection appears to result in greater impairment than each condition alone.

- Jernigan and his colleagues at the HIV Neurobehavioral Research Center of the University of California-San Diego conducted brain scans to analyze structural volume changes in 103 adults divided among four populations: methamphetamine abusers who were HIV-positive; methamphetamine abusers who were HIV-negative; nonabusers who were HIV-positive; and nonabusers who were HIV-negative. They also assessed the ability to think and reason using a detailed battery of tests that examined speed of information processing, attention/working memory, learning and delayed recall, abstraction/executive functioning, verbal fluency, and motor functioning.

- They observed that methamphetamine abuse is associated with increases in the volume of the brain's parietal cortex (which helps people to understand and pay attention to what's going on around them) and basal ganglia (linked to motor function and motivation). HIV infection is associated with prominent volume losses in the cerebral cortex (involved in higher thought, reasoning, and memory), basal ganglia, and hippocampus (involved in memory and learning). Among the recent methamphetamine abusers in the study, the degree of volume increase in the parietal cortex was associated with worse cognitive function.

- The cognitive impairments were associated with decreased employment and vocational abilities, difficulties with medication management, impaired driving performance, and problems with general activities of daily living, such as managing money. These impairments could potentially affect treatment and relapse prevention

efforts, as well as things like money management and driving performance.

- The brain volume changes associated with methamphetamine abuse did not correlate with the amount of the drug a person ingested. However, the study results suggest that younger methamphetamine abusers showed larger effects in some brain regions. Among HIV-infected individuals, the researchers noted a direct association between the severity of the infection and greater loss of brain matter. In methamphetamine abusers who are also HIV-positive, decreased volumes are correlated with increased cognitive impairment in one brain region, the hippocampus.

- Changes seen in brain structures could be the result of inflammation in the brain and/or compensatory changes associated with methamphetamine toxicity. Also, brain inflammation associated with HIV

infection may contribute to brain cell shrinkage or loss. Medications that reduce inflammation might be useful in treating methamphetamine abusers.

- Other work demonstrates that appetite suppression induced by methamphetamine can result in severe weight loss (Nordahl, Salo, & Leamon, 2003). The behavioral effects of methamphetamine include excessive scratching and picking behaviors that can cause severe dermatologic lesions (Peck, Reback, Yang et al., 2005). Methamphetamine is also associated with severe dental disease, due to xerostomia (persistent dry mouth attributable to methamphetamine's sympathomimetic properties), bruxism (excessive teeth grinding), the high intake of soft drinks frequently observed among methamphetamine users, and decreased oral hygiene during periods of methamphetamine use (McGrath & Chan, 2005). Withdrawal from methamphetamine use produces a syndrome that includes severe anxiety, anhedonia, anergia, and mild to moderate depression (Rawson, Gonzales, & Brethern, 2002; Simon, Domier, Carnell et al., 2000).

5. Methamphetamines and HIV Transmission

- Methamphetamine use is a driving force in the transmission of HIV. Methamphetamine's effects on sexual behaviors include increasing sexual drive and decreasing inhibitions, factors that lead persons to engage in high-risk sex (Reback, Larkins & Shoptow, 2004). Research demonstrates that the vast majority of MSM

methamphetamine users report that sex and methamphetamine "always" or "often" go together (Ling, Shoptaw & Majewska, 1998), and qualitative studies report that MSM use methamphetamine specifically to enhance performance of sexual acts (Semple, Patterson & Grant, 2002).

- Most studies estimate that methamphetamine use doubles or triples the probability of engaging in high-risk sexual behavior and acquisition of sexually transmitted infections, including HIV (Shoptaw, et al. 2002; Molitor, et al. 1998; Mansergh, et. al. 2001; Myers, et al. 1992; Paul, Stall & Davis, 1993; Paul, et al. 1994). Methamphetamine use also corresponds with high numbers of sexual partners (Molitor, et al. 1999; Rawson, et al. 2002), and decreased condom use (Halkitis, Parsons, Stirratt, 2001). Most research on methamphetamine use and HIV risk behavior has focused on MSM populations, but the relationship between methamphetamine use and sexual risk has been documented among heterosexual populations of men and women (Semple, Grant, Patterson, 2004; Wohl, et al. 2002), including among persons who inject methamphetamine (Bogart, et al., 2005).

6. Methamphetamines and HIV Pathogenesis

- It is not uncommon to receive vague, poorly defined consultation requests. Many physicians and other referral sources are still unclear as to what services behavioral health consultants can provide and what kinds of information are helpful when making a consultation request. As a result, assessment questions are often ambiguous, unclear, too specific, untimely, or inappropriate.

- The potential direct effects of methamphetamine on HIV and HIV disease progression remain to be determined. One study found that methamphetamine use was associated with higher viral loads and decreased effectiveness of antiretroviral therapy, including after controlling for self-reported adherence to antiretroviral therapy (Ellis, et. al. 2003).

- Co-administration of methamphetamine with antiretrovirals, especially protease inhibitors, may result in elevated methamphetamine levels (Urbina & Jones 2004). There have been several case reports of possible fatal interactions between protease inhibitors and methamphetamine or the methamphetamine analogue n-methyl-3,4methylendioxymethaphetamine (MDMA, "ecstasy") (Hales, Roth & Smith, 2000; Henry & Hill 1998).

- Methamphetamine users report suboptimal adherence to ART regimens and are therefore at risk for the development of resistant virus (Reback, Larkins & Shoptaw, 2003). Although the prevalence of drug-resistant HIV among methamphetamine users with either acute or established HIV infection is unknown, patterns of methamphetamine use may result in especially favorable conditions for the selection of drug-resistance. Among many methamphetamine users, drug use is episodic, consisting of "speed runs" that last for 24 to 72 hours, followed by days or even weeks of drug abstinence (Gorman & Halkitis, 2003). Qualitative research shows that speed runs are frequently associated with "medication holidays," during which medication schedules are often altered or ignored due to altered sleep and food schedules and a singular focus on sexual behavior (Reback, Larkins & Shoptaw, 2003). Such sporadic treatment interruptions could result in favorable selective pressure of drug-resistant virus.

7. Behavioral Treatment Interventions

- Behavioral counseling, in the form of either outpatient or inpatient programs, is the current standard of treatment for methamphetamine abuse. Most programs have been adapted from cocaine and alcohol treatment programs and vary in intensity (Rawson, Gonzales & Brethen, 2002). Among persons who do access behavioral treatment services, methamphetamine use is reduced during treatment in nearly all instances Maglione, Chao & Anglin, 2000; Rawson, Simon & Ling, 2002). Drop-out rates in these programs are as high as 75%, and relapse is common. The minimum number of counseling sessions required to reduce methamphetamine use and the elements of the behavioral counseling that produce optimal drug reduction remain to be determined.

- Most behavioral approaches involve components of motivational interviewing and cognitive-based therapy. A multisite evaluation of the Matrix Model, a behavioral therapy intervention delivered using 48 outpatient group and individual sessions over 16 weeks, was based on an approach previously used to treat cocaine-dependent individuals. Outcomes in a large sample of mostly heterosexual methamphetamine-dependent participants showed that at the 6-month follow-up visit there were no differences in methamphetamine use among persons assigned to Matrix intervention compared with those assigned to a treatment-as-usual comparison condition of outpatient substance treatment; however, methamphetamine use declined in both groups from baseline, and the Matrix intervention was associated with more consecutive methamphetamine-negative urines

during the intervention phase compared with treatment as usual (Rowson, et al. 2004).

- Harm-reduction models are also being used to treat methamphetamine users; the Stonewall Project in San Francisco is designed specifically for methamphetamine users and is well-received by participants but has not been evaluated in a randomized, controlled trial (tweaker.org, 2005). The Project MIX study funded by the Centers for Disease Control and Prevention, which includes large numbers of methamphetamine-using MSM, is a current, randomized, controlled, multisite trial evaluating whether a risk-reduction approach reduces methamphetamine use and sexual risk; final results will not be available for several years.

7. Contingency Management Interventions

- Contingency management involves the provision of vouchers of escalating value for successive urine samples documenting drug abstinence, with reset of the voucher to lower values in the case of positive drug urine. Strategies using contingency management have been shown to reduce use of heroin and cocaine (Higgins, et. al 1993; Iguchi, et al., 1988).

- Shoptaw, et al.(2005) recently reported on the comparative efficacy of contingency management, cognitive-behavioral therapy (based on the Matrix Model), their combination, and a culturally tailored version of cognitive-behavioral therapy for MSM who were methamphetamine-dependent. During the 16-week treatment period, conditions containing contingency management produced more methamphetamine-negative urine samples and greater participant retention compared with standard cognitive-behavioral therapy arm, whereas the culturally tailored therapy version produced greater reductions in sexual risk behaviors compared with standard cognitive-behavioral therapy. By 1-year follow-up evaluations, all conditions sustained over threefold reduction in methamphetamine use and concomitant sexual risk behaviors from baseline (Shoptaw, et al 2005). Although the acceptability and feasibility of contingency management implemented outside formal treatment settings remain to be determined, this approach may be more acceptable to persons unwilling to participate in counseling programs but who would seek to reduce their methamphetamine use.

8. Pharmacologic Interventions

- Compared with extensive research on pharmacologic interventions for treating cocaine and heroin dependence, research on pharmacologic interventions for methamphetamine dependence has only recently expanded (Maglione, Chao & Anglin, 2000). Several observational studies have prescribed stimulants as "replacement therapy" to treat methamphetamine use; however, the only randomized, controlled trial of dextroamphetamine demonstrated no significant differences between the treatment arm and the placebo arm, although both groups reduced their methamphetamine use (Shearer, et al., 2001). Concerns have been raised about providing methamphetamine users with controlled substances given their abuse potential (Grabowski, et al., 2004).

9. Structural Interventions

- The production of methamphetamine may be particularly susceptible to regulation of methamphetamine precursors. Unlike marijuana, cocaine, or heroin, which are derived directly from agricultural products that can be grown in a variety of geographic areas, the precursors to methamphetamine require substantial technology to produce and are manufactured by a limited number of companies. Federal regulations of the sales of bulk ephedrine, pseudoephedrine, and ephedrine-containing products have been associated with reductions in methamphetamine-related hospitalizations, arrests, and methamphetamine purity (Cunningham & Liu 2005, 2003; Suo, 2004).

- Several national United States pharmacy chain stores have recently voluntarily placed all pseudoephedrine-containing products behind counters. Additional structural interventions could potentially include requiring that ephedrines be combined with additives that would impair the process of methamphetamine synthesis or an outright ban on all pseudophedrine-containing products, substituting medications that cannot be synthesized into methamphetamine.

A. The "New" Club Drugs

The information in this section was excerpted from the following source:

Britt, G., & McCance-Katz, E. (2003). A Brief Overview of the Clinical Pharmacology of "Club Drugs". *Substance Use and Misuse*, 40(9 & 10), 1189-1201.

1. Introduction

- The U.S. Office of National Drug Control Policy (ONDCP, 2004a) identifies four specific club drugs: MDMA (methylenedioxymethamphetamine, “Ecstasy”), GHB (gamma-hydroxybutyrate), ketamine, and Rohypnol_R (flunitrazepam). Although an argument could be made to include substances such as methamphetamine and LSD, these were not included for a couple of reasons. For one, they are inconsistently included in the category of club drugs. In addition, they have a longer history of misuse and a correspondingly larger literature.

- Club drugs encompass a variety of medications in several different drug classes. One of the challenges presented by club drugs is the changing face of the “club drug” environment. This environment is associated with the use of multiple drugs and new drugs that defy the development of specific interventions. Club drugs have appeal for younger drug users, but present opportunities for significant toxicity that can be life-threatening or result in permanent morbidity. Understanding the clinical pharmacological aspects of these drugs is important to recognition of their use and misuse, as well as a beginning to the development of effective educational outreach and treatments.

2. MDMA

- Commonly referred to as MDMA, the chemical compound 3,4-methylenedioxymethamphetamine is often referred to on the street with names such as “Ecstasy,” “XTC,” “X,” “E,” “Adam,” “Clarity,” and “Lover’s Speed,” and usually comes in tablet or capsule form (DEA, 2004a; NIDA, 2003).

- MDMA has multiple effects on central neurotransmitter systems. However, its principle effects are on the serotonin system where it is an indirect serotonin agonist. MDMA inhibits tryptophan hydroxylase, which decreases serotonin production (Bialer, 2002). It induces the release of serotonin and also blocks serotonin re-uptake. These effects are thought to be related to the observed depression, anorexia, agitation, and marked feelings of empathy reported in association with use of the drug. Because MDMA depletes serotonin stores in neurons, subsequent doses produce diminished euphoria and increase adverse effects such as depression and agitation.

- MDMA has been shown to increase energy and psychomotor drive, self-confidence, and well-being, and to produce a positive mood, heightened sensory awareness (such as intensified perceptions),

derealization, depersonalization, and to increase responsiveness to emotions and sense of closeness to others (Liechti et al., 2000; Vollenweider et al., 1998). Adverse effects include anxiety and thought disorder, jaw clenching (bruxism), lack of appetite, difficulty concentrating, disturbance of balance, and an increase in blood pressure. In a study of MDMA administration, some of these effects were still reported by some subjects after 24 hours (Vollenweider et al., 1998). In addition, Klitzman, Pope, and Hudson (2000) found a relationship between MDMA use (but not use of other drugs) and high-risk sexual behavior (unprotected anal intercourse) among homosexual and bisexual men attending New York City dance clubs. A stronger association was found between frequent (at least monthly) MDMA use and high-risk sexual behavior compared to less frequent use.

- More severe effects related to MDMA have also been reported (O'Connor, 1994). At least nine deaths related to hyperthermia have been noted, occurring after ingestion of MDMA along with extended episodes of heightened physical activity in the absence of adequate hydration and ventilation.

3. GHB

- GHB (gamma-hydroxybutyrate) is available as a clear liquid, white powder, tablet, or capsule and can be made in private residences with ingredients and recipes obtained on the Internet (DEA, 2004b; NIDA, 2003). Typically it is ingested in liquid form and often mixed with alcohol, which amplifies its effects (DEA, 2004a; NIDA, 2003). Street names include "Liquid Ecstasy," "Scoop," "Easy Lay," "Georgia Home Boy," "Grievous Bodily Harm," "Liquid X," and "Goop" (DEA, 2004a, b).

- GHB inhibits dopamine release and activates tyrosine hydroxylase, that together act to increase central dopamine levels (Galloway et al., 2000), which could be associated with the reinforcing effects of GHB.

- Aside from its use as a nutritional supplement and for bodybuilding use, it is misused to achieve euphoria (DEA, 2004b; Galloway et al., 1997) as well as for effects similar to alcohol (Friedman, Westlake, and Furman, 1996; Galloway et al., 1997; Steele and Watson, 1995), and to alleviate anxiety, increase relaxation, and enhance libido (Galloway et al., 1997; NIDA, 2003).

- Adverse effects related to GHB include drowsiness/sleep induction, loss of consciousness/coma, tremors, agitation, seizure-like activity,

gastrointestinal symptoms (vomiting, bladder, and bowel incontinence), CNS and respiratory depression, vertigo/dizziness, confusion, hallucinations, bradycardia, and decreased respiration (CDC, 1990; Dyer, 1991; Friedman,Westlake, and Furman, 1996; Galloway et al., 1997; Ingels et al., 2000; Li Stokes and Woeckener, 1998; Sporer et al., 2003; Steele and Watson, 1995). Due to its depressant effects, overdose can occur quickly and has been associated with deaths (NIDA, 2003). In fact, the DEA has documented at least 71 GHB-related deaths (2004a). However, generally most adverse symptoms resolved within a few hours (CDC, 1990; Craig et al., 1999; Ingels et al., 2000; Sporer et al., 2003; Steele andWatson, 1995), although some report effects for 4 days (CDC, 1990; Friedman,Westlake, and Furman, 1996) and two reports note dizziness for up to 14 days (Dyer, 1991; Steele and Watson, 1995).

- There is a fair amount of overlap in what appear to be adverse symptoms due to acute effects, and withdrawal symptoms (which are related to dependence and reportedly take longer to resolve). As such, it is possible that some of the symptoms reported to be adverse effects that take longer to resolve might actually be withdrawal symptoms. Dependence on GHB has been described as developing after regular use—every 2 hours around the clock—for 2 months to 4 years (McDaniel and Miotto, 2001). In general, withdrawal symptoms include insomnia, muscular cramping, tremor, perspiration, anxiety, and feelings of doom (Craig et al., 1999; Galloway et al., 1997).Withdrawal from higher doses includes bowel/bladder incontinence and blackouts (Galloway et al., 1997).

4. Ketamine

- A liquid that can be injected, ketamine can also be added to items to be smoked. By allowing the liquid to evaporate, a powder is produced that can be dissolved in drinks, smoked, snorted, or dissolved and injected (DEA, 2004b; NIDA, 2003). Street names include “K,” “Special K,” and “Cat Valium” (DEA, 2004b).

- It has also been suggested that ketamine, through its binding to the NMDA receptor, can inhibit the reuptake of serotonin, dopamine, and norepinephrine, although the mechanism underlying this action is not entirely clear (Smith, Larive, and Romanelli, 2002).

- When misused, low doses are associated with feelings of relaxation called “K-land,” while higher doses can produce dreamlike states, hallucinations, visual distortions, and sensation of near-death experience called a “K-hole” (DEA, 2004b; NIDA, 2003; Rome,

2001). Its use has also been associated with unintentional injuries that can occur because the user is insensitive to pain (Rome, 2001). In addition it has been associated with sexual assault because of its dissociative effect in humans (DEA, 2004b).

- Acute adverse effects include increased heart rate, hypertension, impairment of motor functioning, respiratory depression, nausea, immobility that leads to abnormally low body temperature, anxiety, dissociation, depression, recurrent flashbacks, delirium (confusion disordered speech, hallucinations), amnesia, impaired attention, learning disability, and symptoms of schizophrenia (Bourke, Malit, and Smith, 1987; DEA, 2004b; Harris et al., 1975; Krystal et al., 1994; NIDA, 2003; Perel and Davidson, 1976; Rome, 2001; Weiner et al., 2000). Effects due to chronic misuse include cognitive difficulties in areas such as attention, learning, and memory (DEA, 2004b).

5. Rohypnol

- Rohypnol_comes in pill form and is typically taken orally, although reports of it being ground and snorted are also available (NIDA, 2003). Street names include “Roofies,” “Rophies,” “Roche,” “Forget-me Pill,” “Circles,” “Mexican Valium,” “Rib,” “Roach-2,” “Roopies,” “Rope,” “Ropies,” “Ruffies,” and “Roaches” (DEA, 2004b).

- Rohypno (flunitrazepam) is a sedative/hypnotic benzodiazepine that is approved for therapeutic use in Latin America, Europe, Asia, and Australia, but not legally available in the United States (Calhoun et al., 1996).

- It is commonly associated with sexual assault due to the profound sedation it causes, along with its anterograde amnesic property in which an individual cannot recall events that took place while under the influence of the drug (DEA, 2004b; Schwartz and Weaver, 1998). It is odorless and tasteless and is easily dissolved in beverages (NIDA, 2003), allowing a perpetrator to add it to the beverage of a potential victim. The manufacturers, Hoffman-LaRoche, are now adding a blue dye to the pill that will be visible if added to a beverage (DEA, 2004b).

- Rohypnol is used illicitly to achieve a feeling of relaxation similar to alcohol intoxication (Calhoun et al., 1996; Schwartz and Weaver, 1998). It also may be taken together with heroin to enhance the effects of heroin, as well as to decrease the experience of opiate

withdrawal symptoms (San et al., 1993), and enhance the effects of other substances including alcohol and marijuana, and to lessen the adverse stimulant effects of cocaine (Calhoun et al., 1996). It also reduces anxiety, increases an individual's comfort in social situations (Calhoun et al., 1996; Schwartz and Weaver, 1998), and induces euphoria (Farre et al., 1998).

- Acute adverse effects associated with Rohypnol_R ingestion include a decrease in body temperature, sedation (Farre et al., 1998), impairment of cognitive and psychomotor tasks (Farre et al., 1998; Mintzer and Griffiths, 1998), sleepiness (Schwartz and Weaver, 1998), decreased blood pressure, visual disturbances, dizziness, confusion, gastrointestinal disturbances, and urinary retention (NIDA, 2003).
- Dependence on flunitrazepam can develop and withdrawal symptoms include headache, tension, anxiety, restlessness, muscle pain, sensitivity to light, numbness and tingling of extremities, and seizures (Schwartz and Weaver, 1998).

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