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“Research Chemicals”: Tryptamine and Phenethylamine Use Among High-Risk Youth

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Abstract

Tryptamines and phenethylamines are two broad categories of psychoactive substances with a long history of licit and illicit use. Profiles of users of recently emerging tryptamines and phenethylamines are nonexistent, however, since surveillance studies do not query the use of these substances. This manuscript describes the types, modes of administration, onset of use, and context of use of a variety of lesser known tryptamines and phenethylamines among a sample of high-risk youth. Findings are based upon in-depth interviews with 42 youth recruited in public settings in Los Angeles during 2005 and 2006 as part of larger study examining health risks associated with injecting ketamine. Youth reported that their use of tryptamines and phenethylamines was infrequent, spontaneous, and predominately occurred at music venues, such as festivals, concerts, or raves. Several purchased a variety of these “research chemicals” from the Internet and used them in private locations. While many described positive experiences, reports of short-term negative health outcomes included nausea, vomiting, diarrhea, disorientations, and frightening hallucinations. These findings, based upon pilot study data, move toward an epidemiology of tryptamine and phenethylamine use among high-risk youth.

Keywords

hallucinogen; high-risk youth; injection drug user; phenethylamine; tryptamine

Introduction

Tryptamines and phenethylamines are two broad categories of psychoactive substances that produce a range of hallucinogenic effects. More commonly known tryptamines, such as LSD,

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Ibogaine, and psilocybin (“magic mushrooms”), and ordinary phenethylamines, including mescaline and MDMA (“ecstasy”), have been widely researched (see Griffiths, Richards, McCann, and Jesse, 2006; Kalant, 2001; Nichols, 2004; Sewell, Halpern, and Pope, 2006; Vastag, 2005). However, little is known about less common tryptamines, such as DMT, AMT, and 5-MEO-DIPT (“Foxy”), or phenethylamines, such as 2C-B (“Nexus”), 2C-E, and 2C-T-7 (“Blue Mystic”). This study describes the types and contexts of use among these lesser known tryptamines and phenethylamines among a sample of high-risk youth.

Tryptamines and phenethylamines have a long history of licit use for spiritual and medicinal purposes and illicit use for recreational purposes (Halpern, 2004; McKenna, 2004; cf. Jacob and Presti, 2005). More recently, tryptamines and phenethylamines, such as DMT, 2C-B, and 5-MEO-DIPT have been consumed by young people in club and rave environments (Measham, 2004; Sanders, 2006; cf. Yacoubian et al., 2004), and traces of these substances have been found in pills sold as “ecstasy” in the United States, the UK, and elsewhere (Australian Bureau of Criminal Intelligence [ABCI], 2002; Carmo et al., 2005; Drug Enforcement Administration [DEA], 2003, 2005; Laks et al., 2004; Winstock, Wolff, and Ramsey, 2001). The Internet has also facilitated the illicit use of tryptamines and phenethylamines in recent years. Various Web sites now offer information about where to find plants that naturally contain a tryptamine or phenethylamine and how to extract these drugs from plants (see Halpern, 2004). Tryptamines and phenethylamines can be ordered over the Internet through companies selling them as “research chemicals” (McCandless, 2004; cf. Halpern and Pope, 2001; Kikura-Hanajiri, Hayashi, Saisho, and Goda, 2005).

Despite increased access at raves and on the Internet, tryptamines and phenethylamines are not included in drug monitoring surveys and, therefore, surveillance data do not exist. A handful of clinical accounts, however, have emerged in recent years, each concerned with individual cases of one type of tryptamine or phenethylamine (e.g., Carmo et al., 2005; Muller, 2004; Tanaka, Kamata, Katagi, Tsuchihashi, and Honda, 2006; Wilson, McGeorge, Smolinske, and Meatherall, 2005). Moreover, international concern over tryptamines and phenethylamines has increased. In Great Britain, for instance, most tryptamines and phenethylamines were outlawed in 2002 and are now considered Class A (Schedule I) substances (see McCandless, 2004). In the United States, the DEA classified some tryptamines and phenethylamines as Schedule I substances but not others. For instance, while it remains illegal to possess DMT or 2C-B, possession of their chemical cousins, 5-MeO-DMT or 2C-I, continues to be legal. Under the Analogue Statue of the Controlled Substance Act, however, it is illegal to traffic any substances chemically analogous to scheduled tryptamines and phenethylamines. Due to the increasing availability of these substances on the Internet, the DEA launched Operation Web Tryp in 2004, which targets individuals and companies illegally selling tryptamines and phenethylamines. Despite the increasing restrictions on access and manufacture, many of the tryptamines and phenethylamines discussed here remain legal to use and possess.

Methods

The use of tryptamines and phenethylamines among high-risk youth was discovered during a two-phase, three-city study examining health risks associated with injecting ketamine (see Lankenau, 2006; Lankenau et al., 2007; Lankenau and Sanders, 2007). Ketamine is a dissociative anesthetic that has emerged as a drug commonly used in the dance/rave scene (Jansen, 2001) and among subgroups of young IDUs (Lankenau et al., 2007). Phase one comprised a cross-sectional, ethnographic survey of young IDUs recruited in New York, New Orleans, and Los Angeles. Phase two consisted of a two-year longitudinal study of young IDUs recruited in Los Angeles during Phase one. Data described in this manuscript are largely based upon respondents recruited in Los Angeles; therefore, the discussion of methods primarily

focuses on the Los Angeles site (see Lankenau et al., 2007, for a discussion of three-site methodology).

Phase One¹

Data collection began with a community assessment process (CAP; Clatts, Rees Davis, and Atillasoy, 1995) by two trained ethnographers in Los Angeles to determine the locations of groups of young people who injected ketamine. Ethnographers interviewed key informants, such as directors of homeless shelters, health clinic staff, needle exchange coordinators, or outreach workers. Based upon the CAP, ethnographers recruited young ketamine injectors using a combination of chain referral sampling (Biernacki and Waldorf, 1981; Penrod, Preston, Cain, and Starks, 2003) and targeted sampling (Watters and Biernacki, 1989). Guided by this sampling methodology, ethnographers entered three neighborhoods in Los Angeles reported to contain populations of young people and IDUs, observed the activities in the area, engaged young people in informal conversations, and screened individuals who might meet the enrollment criteria. Recruitment and observations occurred during an 18-month period during 2005 and 2006.

Young people were eligible for study enrollment if they were between the ages of 16 and 28 and had injected ketamine at least once within the past two years. These criteria were selected to enroll a sample of young IDUs who could describe recent ketamine injection events. A series of screening questions focusing on health behaviors, recent drug use, and history of homelessness were asked in order to hide the true enrollment criteria. Before beginning an interview, individuals signed informed consent documents approved by an Institutional Review Board at Childrens Hospital Los Angeles. Each interview lasted between 60 and 90 minutes and was conducted in the vicinity of recruitment locations, either in private areas of restaurants, parks, or in the ethnographer's offices. Subjects received a \$20 cash payment after the interview, as well as referral information for local needle exchanges, health clinics, homeless shelters, and other service organizations for high-risk youth populations.

Phase Two

Ketamine injectors recruited in Los Angeles during phase one were eligible for enrollment into the phase two longitudinal study. All IDUs consented for participation in a series of seven follow-up interviews occurring approximately every 3–4 months. During the cross-sectional baseline interviews in Los Angeles, locator information, such as telephone numbers and e-mail addresses, were collected from each participant. Additionally, ethnographers provided each participant with a toll-free telephone number that connected directly to an ethnographer's cell phone. Respondents who traveled outside of Los Angeles following baseline were interviewed over the telephone, and payments were sent via Western Union. Cash incentives increased for each interview by \$5, so that participants earned \$25 for the first follow-up, \$30 for the second follow-up, and so on. Subjects were consented at each follow-up interview to detail any changes to the study design and to remind them of their rights as human subjects.

¹Ethnographers approached a variety of young people differentiated by race, gender, age, and style and kept brief notes on appearances and responses. Youth who qualified, however, were predominately homeless. Homeless youth are a vulnerable population, and the ethnographers, who have worked on several research projects involving high-risk youth, were particularly sensitive to their concerns. While youth were told that the research would not directly benefit them, many expressed their gratitude for the interview incentive, the light snacks they were provided during the interview, and the chance to talk about their lives to interested professionals in comfortable settings. None of those who qualified for the interview refused to participate. Youth were informed of their rights as research participants, and their disclosures were further protected by a Federal Certificate of Confidentiality. Due to the nature of the research, the amount of youth recruited, and the breadth of topics covered, limited information was gathered about the dynamics of the youth in terms of their skills, values, functioning abilities, social networks, and adaptations regarding their use of substances outside ketamine.

Measures and Analyses

The phase one interview guide, which was administered to all subjects recruited in New York, New Orleans, and Los Angeles, contained eight domains or modules and captured data on demographics, drug using histories, recent drug use, and risk behaviors. The phase two interview guides, which were utilized only in Los Angeles, followed up on key risk behaviors, such as changes in homeless status, injection drug using behaviors, criminal justice involvement, and drug using behaviors. Additionally, new modules were included in each subsequent interview to probe important areas that emerged during earlier interviews, such as use of tryptamines and phenethylamines.

Interview guides, which contained both structured, close-ended questions and probing, qualitative questions, were administered on laptop computers using Questionnaire Development Software, and interviews were recorded with digital recorders. Open-ended, qualitative questions were analyzed using ATLAS ti., and closed-ended quantitative questions were analyzed using SPSS and SAS.

Discussions of tryptamines and phenethylamines were first encountered during phase one interviews in New York. After being read an extensive list probing for overall substance use, youths were then asked, “*Have you used any other drugs?*” Ethnographers in Los Angeles and New Orleans later discovered during phase one interviews that some youth mentioned using these same drugs. Tryptamines and phenethylamines use, however, was most extensively probed during the first follow-up interview in Los Angeles when youth were asked about the types, administrations, frequencies, locations, and experiences regarding their tryptamine and/or phenethylamine use. We report findings based upon data collected in Los Angeles since descriptions of tryptamine and phenethylamine use were most complete at this site.

Results

Sample Characteristics

The Los Angeles sample consisted largely of young White men, with a median age of 22, with histories of homelessness, incarceration, and drug treatment (see Table 1). Out of these youth, 42 mentioned using at least one tryptamine and/or phenethylamine in their lifetime. Youth who had used a tryptamine and/or phenethylamine were likely to report being male, White, heterosexual, and a “traveler.” Travelers are nomadic, predominantly homeless youth who travel around the country for various reasons (see Des Jarlais, Perlis, and Settembrino, 2004; Hathazi, Lankenau, Sanders, and Jackson-Bloom, 2005; Hyde, 2005).

The sample also has an extensive history of drug use (see Table 2). Categorizing these youth as “heroin users,” “cocaine users,” or “ketamine users,” however, would be inaccurate. Rather, these youth could be more accurately described as “polydrug users” who regularly used two or more drugs simultaneously or over a short period of time (e.g., over the course of a day; see Lankenau and Clatts, 2005; Sanders, 2006). Youth who used a tryptamine and/or phenethylamine had an overall earlier mean age of initiating most other illicit substances, including common tryptamines, such as LSD and psilocybin mushrooms, and a common phenethylamine, ecstasy. Moreover, tryptamine and phenethylamine users were more likely to have ever used other drugs, including LSD, ecstasy, and psilocybin mushrooms, but also many others, such as PCP, GHB, cocaine, crystal methamphetamine, and a range of prescription drugs non-medically.

Range, Frequency, Onset of Use, Modes of Administration, and Dosages

Youth used between one and 12 different tryptamines at least once, and between one and eight different phenethylamines at least once (see Table 3). Sniffing and swallowing were the most

common administrations. Dosages were difficult to gauge since very few mentioned measuring what they ingested. Rather, youth talked about swallowing “a capsule”; “sprinkling” drugs in a joint, pipe, or bong, filled with marijuana; sniffing a “line”; injecting a “solution”; or swallowing an ecstasy tablet that also contained these substances. Youths who did report on their doses of tryptamines or phenethylamines mentioned amounts measured in milligrams (e.g., 5, 10, 20 mg).

Contexts of Tryptamine and Phenethylamine Use

The majority of users in the sample (n = 34) only consumed a tryptamine and/or phenethylamine on one or two occasions in their lifetimes. Use occurred while intoxicated on a combination of other substances (e.g., alcohol, cannabis, heroin, LSD, cocaine) at music festivals, concerts, and parties, whereby individuals—both friends and strangers—offered them a tryptamine (primarily DMT or AMT) or a phenethylamine (primarily 2C-B, 2C-I, or 2C-E), which they either smoked or swallowed immediately. Often, these youths did not have knowledge of the tryptamine or phenethylamine they ingested, what to expect, or the amount ingested.

A smaller number (n = 8) of youth used many different tryptamines and phenethylamines. Some purchased these substances from the Internet, where they were promoted as “research chemicals.” These youth knew exactly what they consumed, how much they used, and what effects to expect from these substances. Such youth administered these substances in a variety of ways, including sniffing and injecting. Significantly, they were able to describe the effects and distinguish differences among the numerous types of tryptamines and phenethylamines. These youth had used tryptamines, such as DMT, AMT, DiPT, their 5-MeO analogues, and phenethylamines, 2C-B, 2C-I, DOB, and 2C-E on several to many occasions, but other tryptamines, such as 4-HO-MiPT and 5-MeO-DPT, and phenethylamines, 2C-T-2 and 2C-P, only once or twice. While these youth had also used such substances at festivals and parties, they also used them in more secure locations, such in their homes.

Experiences and Effects

Reports from tryptamine and phenethylamine users on Web site chat rooms (e.g., <http://www.erowid.com> and <http://www.lycaeum.com>) and the literature (e.g., Rushkoff, 1994; Shulgin and Shulgin, 1991, 1997) generally indicate that these substances cause auditory, visual, and temporal distortions (i.e., hallucinations), though use of any of these substances is likely to depend on the user and their location (Zinberg, 1984). Most in the sample reported positive experiences while using these substances, discussing them as “psychedelic” and “visually hallucinogenic” whereby “you see all kinds of things that aren't really there.” No distinctions emerged among the youths' reports on the effects of these drugs. Likewise, youth reported similar negative side effects after use. For instance, several youth reported nausea, vomiting, and dizziness after using AMT, 5-MeO-AMT, and 2C-P. Youth also mentioned an uneasy feeling after using 2C-B and 2C-I, and one youth reported “the most horrible diarrhea” after using 2C-E. Many youth who used any tryptamine or phenethylamine reported headaches, body aches, constipation, as well as feelings of depression and confusion that lasted from several hours to several days after use. A few of the youth who smoked DMT without actually knowing what they used suffered disorientations and frightening experiences. Additionally, being unfamiliar with a tryptamine or phenethylamine, some consumed too much of these substances in one setting, which resulted in unpleasant experiences.

Discussion

This manuscript has presented a preliminary epidemiology of tryptamine and phenethylamine among high-risk youth. Limitations include a small, unrepresentative sample, the possibility that respondents were not truthful, displayed recall bias, or provided socially desired reporting.

The sample is also particular given their high rates of ketamine injection, homelessness, arrest, incarceration, drug treatment, and mental health treatment. These characteristics suggest that these youth are somewhat dissimilar from the general population of young people, and findings and conclusions regarding uncommon tryptamines and phenethylamines may thus be distinct among them.

Overall, most youth in the sample who had used a tryptamine and phenethylamine did so at music festivals with little prior knowledge about what they consumed. These youth were often offered these drugs by strangers while intoxicated on a variety of other substances. A few youth purchased these substances on the Internet as “research chemicals” or from friends who had done so. These youth consumed these substances in private settings and knew exactly what substance they ingested and had rough ideas about what to expect in terms of the drugs' effects. Regardless of context, all youth reported similar positive experiences while using these substances and comparable negative side effects.

The long-term negative health outcomes, such as cognitive impairment, drug dependence, and mental health disorders, associated with the use of the tryptamines and phenethylamines are unknown. Cognitive impairment and neurological toxicity, for instance, has been associated with more common tryptamines and phenethylamines, such as MDMA and LSD, though these findings are disputed (see Check, 2004; Halpern and Pope, 1999; Kalant, 2000; Nichols, 2004). More research is needed in these areas, including asking about lesser known tryptamines and phenethylamines in drug monitoring studies. Such measures may allow for generalizations about tryptamine and phenethylamine use among youth to emerge.

Greater regulation needs to be in place over the availability of various tryptamines and phenethylamines. Excluding the 20 reported on here, we found an additional 39 tryptamines and 170 phenethylamines on the Internet (see also Shulgin and Shulgin, 1991, 1997). Many tryptamines and phenethylamines have a long history of utility in therapeutic fields, including research conducted by those at the Multidisciplinary Association for Psychedelic Studies (MAPS; see <http://www.maps.org>). Furthermore, recent research indicates positive medicinal qualities associated with the use of the tryptamines psilocybin and LSD on humans (see Griffiths et al., 2006; Sewell et al., 2006), and others have suggested the potential therapeutic utility of other tryptamines, such as DMT and Ibogaine, and phenethylamines, such as MDMA and mescaline (see McKenna, 2004; Sessa, 2005; Vastag, 2005). Exploring the further utility of tryptamines and phenethylamines may lead to novel and successful therapeutic and other interventions aimed at improving mental and physical health.

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Glossary

Hallucinogens

substances regarded as hallucinogens produce visual, auditory and temporal distortions, whereby users experience disruptions in the way they see and hear things, as well as a feeling that time is speeding up or slowing down. These are often qualitatively described as *hallucinations*. Different hallucinogens at various doses produce these visual, auditory, and temporal distortions at varying degrees.

High-Risk Youth

includes adolescents and young adults who engage in drug use, including injection drug use and polydrug use, teenage parents, homeless youth, young men who have sex with men, youth involved in the criminal justice system, gang members, and sex workers. Such youth are considered high risk because of their behaviors, which place them at risk for a variety of negative health and social outcomes (e.g., sexually transmitted infections, including HIV and HCV, addiction, incarceration, exclusion, injury, disability, death).

Injection Drug User

often abbreviated as IDUs, are individuals who have administered illicit drugs via a syringe inserted into a vein (intravenous, IV), into a muscle (intramuscular, IM), or into the skin (subcutaneous).

Phenethylamines

phenethylamines discussed in this manuscript may best be considered psychedelic phenethylamines, a family of psychoactive substances primarily regarded for their hallucinatory properties. Common phenethylamines of this order include mescaline and MDMA (“ecstasy”). Lesser known phenethylamines are often referred to in their abbreviated names (2CB, 2CT7, DOB). Phenethylamines naturally occur in animals and plants but can also be synthetically produced.

Tryptamines

tryptamines discussed in this manuscript may best be considered psychedelic tryptamines, a family of psychoactive substances primarily regarded for their hallucinatory properties. Common tryptamines of this order include LSD (“acid”) and psilocybin found in magic mushrooms. Lesser known tryptamines are often referred to in their abbreviated names (e.g., DMT, AMT, 5MEODiPT), whereby the final letter, “T,” represents tryptamine. Tryptamines naturally occur in animals, plants, and fungi but can also be synthetically produced.

The Authors



Bill Sanders, Ph.D., is an assistant professor in the Department of Pediatrics at the University of Southern California and a researcher within the CHOIR program, Saban Research Institute, Childrens Hospital Los Angeles. His research interests include homeless youth, injection drug use, club drug use, polydrug use, gang youth, youth violence, and general involvement in offending. He is currently an ethnographer and analyst on three-city study of the health risk surrounding the injection of ketamine and a principal investigator on a public health study of gang-identified youth in Los Angeles. Both studies are funded by the National Institute on Drug Abuse. His latest book, *Drugs, Clubs and Young People: Sociological and Public Health Perspectives*, was published in 2006 by Ashgate.



Stephen E. Lankenau, Ph.D., is an assistant professor at the University of Southern California, Keck School of Medicine, Departments of Pediatrics and Preventative Medicine. Trained as a sociologist, he has studied street-involved and other high-risk populations for the past 10 years, including ethnographic projects researching homeless panhandlers, prisoners, sex workers, and

injection drug users. Currently, he is principal investigator of a 4-year NIH study researching ketamine injection practices among young IDUs in New York, New Orleans, and Los Angeles.



Jennifer Jackson Bloom received her MPH with a specialization in epidemiology from the University of California, Los Angeles. She works with the Division of Research on Children, Youth and Families at Childrens Hospital Los Angeles. Her research interests include behavioral risk in substance abusing populations, modeling longitudinal change in substance use and the application of geography to drug abuse research.



Dodi Hathazi graduated with a B.S. in psychology, magna cum laude, from Saint Lawrence University in Canton, New York. She works as an ethnographer with the Division of Research on Children, Youth and Families at Childrens Hospital Los Angeles. Her research interests include polydrug use patterns among homeless traveling youth and reproductive health issues including pregnancy rates and outcomes in high-risk youth. Previously, she worked at the RAND Corporation in Santa Monica, California, in the Survey Research Group where she collected data for three behavioral research projects.

Table 1

Selected demographic characteristics

	Los Angeles (n = 101)	Tryp/phen users (n = 42)
Median age	22	22
Male	64.7%	69.0%
Race and ethnicity		
White/Caucasian	73.5%	88.1%
Black/African American	1%	—
Hispanic/Latino	5.9%	2.4%
Asian or Pacific Islander	1%	—
Native American	1%	—
Multiracial background	14.9%	9.5%
Sexual identity		
Heterosexual	75.2%	83.3%
Gay/lesbian	2.0%	2.4%
Bisexual	19.8%	9.5%
Other/undecided	3.0%	4.8%
High school graduate/GED	60.4%	61.9%
Homeless	94.1%	95.2%
Homeless traveler	68.3%	81.0%
Ever homeless	100%	100%
Employed full/part time	12.9%	11.9%
History of drug treatment	58.4%	61.9%
History of mental health care	75.2%	71.4%
Ever arrested	94.1%	95.2%
Ever in jail	88.1%	92.9%
Ever in prison	14.9%	19%
Tested for HIV	94.1%	90.5%
HIV positive	—	—
Tested for HCV	87.1%	83.3%
HCV positive	24.8%	28.6%

Table 2

Substance use characteristics (N = 42)

	Mean age at initiation	Ever used (%)
Alcohol	11.6	100
Marijuana	11.7	100
Inhalants	13.8	95.2
LSD	14.9	100
Cocaine	15.4	97.6
Mushrooms	15.2	97.6
Heroin	15.8	88.1
Speed	15.5	95.2
Poppers	16.5	52.4
Ecstasy	16.8	90.5
PCP	17.2	64.3
Other drugs	17.3	100
Ketamine	17.1	100
Crack	17.0	88.1
Speedball	16.9	69.0
GHB	17.1	57.1
Prescription opiates	Data missing	97.6
Prescription tranquilizers	Data missing	97.6
Prescription stimulants	Data missing	69.0

Table 3
Tryptamine and phenethylamine: Age at onset, lifetime use, lifetime frequency, administrations, and dosages (n = 42)

Type	Drug	Age at onset of use	Lifetime use, N (%)	Lifetime frequency	Administrations	Dosages
Tryptamine	DMT	13-23	37 (88%)	1-12	sw sn sm	tb sp ln
	AMT	15-23	13 (31%)	1-10	sw sn sm in	sl sp ln cp tb
	DiPT	17	2 (5%)	1	sw	cp
	5-MeO-DMT	15-22	7 (17%)	1-40	sw sn sm in	sl sp ln cp tb
	5-MeO-AMT	15-24	6 (14%)	1-30	sw sn	cp ln
	5-MeO-DiPT	17-22	7 (17%)	1-20	sw sn in	cp ln so
	DpT	17	1 (2%)	1	sw	cp
	5-MeO-DPT	18	1 (2%)	1	sw	cp
	4-ACO-MIPT	17	3 (7%)	1	sw sn	cp ln
	4-HO-MIPT	16-17	3 (7%)	1	sw sn	cp ln
	4-HO-DIPT	17-18	3 (7%)	1	sw	cp
	4-HO-DPT	Missing	1 (2%)	1	sw	cp
Phenethylamine	2C-B	17-21	12 (29%)	1-6	sw sn	cp sc ln
	2C-I	15-20	11 (26%)	1-25	sw	cp ds
	2C-E	16-18	9 (21%)	1-5	sw sn	cp ds ln
	2C-P	19	1 (2%)	1	sw	cp
	2-CT-7	17-18	5 (12%)	1	sw	cp
	2-CT-2	16	3 (7%)	1	sw	cp
	DOI	18-19	2 (5%)	1	sw	cp
	DOB	Missing	1 (2%)	1	sw	cp

Key: in = inject; sm = smoke; sn = sniff; sw = swallow; tb = tablet; sp = sprinkle; ln = line; sl = solution; ds = dosed; cp = capsule; sc = sugar cube.