SDRL Laboratory

TOXICOLOGY TIMES

SDRL Laboratory

(800) 677-7995

www.sdrl.com

A FREE Monthly Newsletter for Substance Abuse and Opioid Treatment Programs from San Diego Reference Laboratory

Volume 10, Issue 5

May, 2020

KETAMINE: Anesthesia, Antidepressant, Hallucinogen

Dr. Joseph E. Graas, Scientific Director
Dr. Edward Moore, Medical Director

Anesthesia

The last issue of the Toxicology Times detailed the complications associated with the use of PCP as a surgical anesthetic, use in the veterinary surgical procedures, and abuse in the general population. The multiple issues led to the restriction of use for any reason in 1979. PCP was synthesized by Calvin Stevens in 1962 and was first used by Domino and Corssen in 1965, ultimately becoming the first man-made drug of abuse and first in the class of drugs labeled as a hallucinogen. The continued search for a better anesthetic agent led to the discovery of ketamine. The properties of ketamine soon proved to be a much better option over PCP as it did not have all the problems of the former drug which it is chemically and structurally derived from. Patients who were administered ketamine as anesthesia reported effects of a "dissociative" nature, indicating they felt completely unattached to their person and surroundings.

The Food and Drug Administration approved ketamine in 1970, and soon after was used on injured soldiers during the Vietnam War. Ketamine was ideally suited for this type of use because of its large margin of safety, which is the difference between effective dose and toxic dose. Since 1994, many clinical studies have found that ketamine is not only useful to relieve short term pain but can be an effective way to treat certain chronic pain syndromes such as fibromyalgia, migraines, and burns. Ketamine remains invaluable to the fields of anesthesiology and critical care medicine, in large part due to its ability to maintain cardiorespiratory stability while providing effective sedation and analgesia.

Antidepressant

In addition to relieving physical pain, ketamine was found to ease pain of a psychological nature. An unexpected finding occurred during a study observing the effects of ketamine in low doses as a model for schizophrenia. In depressed patients, ketamine had an antidepressant effect. In the year 2000, the first randomized, double-blind study was published in Biological Psychiatry. In this study, Dr. Berman et al. reported the antidepressant effects of ketamine in patients suffering from depression. In 2012, researchers called ketamine, "the biggest breakthrough in depression research in a half century." Other studies are showing that ketamine may be effective in OCD, PTSD, anxiety, and suicidal ideation as well.

Drug of Abuse and Hallucinogen

Ketamine has gained popularity as a 'club drug' due to its hallucinogenic and sedative effects. Ketamine, also known by its street names such as: "Cat valium", "Flatliners", "Jet", "K", "Kaddy", "Kate", "Ket", "Kéta K", "K-Hole", "Kit Kat", "Liquid E", "Liquid G", "Mauve and Green", "1980 acid", "Purple", "Special K", "Special LA coke", "Super acid", "Super C", "Super K", "Tac et Tic", "Vitamin K". This drug is sold on the streets in a white crystalline powder or tablet, and in the clinical setting as an injectable prescription formulation. It can be ingested, smoked, snorted, or injected intravenously or intramuscularly. It is important to be aware of abuse of this substance and have a high degree of clinical suspicion to enable early diagnosis and immediate initiation of multidisciplinary and holistic treatment. A delayed diagnosis can lead to irreversible pathological changes and increased morbidity among ketamine abusers.

Ketamine has a progressive effect on the user. First, the user experiences euphoria, followed by a state of dreamy intoxication, out-of-body experiences, altered sensations and amnesia. Although these addictive effects typically last an hour or less, the adverse effects can be long-lasting. Commonly known adverse effects include cardiorespiratory effects, nausea, vomiting, hallucinations and convulsions. Chronic and long-term use leads to damage of many organs including the brain.

Ketamine is metabolized to at least two parent compounds. The parent compounds and both major metabolites are further transformed by hydroxylation and conjugation prior to elimination. About 90% of a dose is excreted in urine in 72 hours, with about 2% of the dose unchanged ketamine. There are different methods described in the literature to analyze ketamine in urine. One of them is an analytical method using solid-phase extraction and positive ion chemical ionization-gas chromatography-mass spectrometry (PCI-GC-MS). Detection times are extremely variable, and the detection period is usually listed as 48-72 hours, but some individuals have shown to be positive up to 11 days. The prevalence of abuse of ketamine is not high, and it really is considered a club drug similar to MDMA or GHB. Screening for ketamine routinely in a drug panel is not usually performed and must be specifically requested.

Reference:
Domino, E. F. (2010). Taming the Ketamine Tiger. *Anesthesiology,*1. doi:10.1097/aln.0b013e3181ed09a2

Berman, R. M., Cappiello, A., Anand, A., Oren, D. A., Heninger, G. R., Charney, D. S., & Krystal, J. H. (2000). Antidepressant effects of ketamine in depressed patients. *Biological Psychiatry,47*(4), 351-354. doi:10.1016/s0006-3223(99)00230-9