

Propofol Dependence: The Hidden Addiction

By Dr. Paul H. Earley, M.D., FASAM

Propofol is an anesthetic agent, released in its current form in 1986. Since its initial appearance, its use has become widespread due to its rapid onset of anesthesia, patient tolerability, and few side effects. Propofol interacts with addiction-related receptors in the brain. Some studies suggest that propofol stimulates the production of proteins that are associated with changes in neural circuitry that accompany addictive responsiveness.

Propofol is shipped as an emulsion in moderately large volume containers. Due to its bulky nature and its presumed low addiction liability, it has been stored within hospitals areas with fairly easy access. Thus, it has been readily available for diversion. Due to increased reports of its diversion by health care professionals, DEA scheduling has been proposed.

Over the past 25 years of treating and managing healthcare providers, we have recognized a small group of propofol-abusing patients under our care. I must admit that early on I considered propofol dependence a curiosity rather than a malignant form of addiction. When we woke up and made note of an increasing numbers of propofol abuse cases, we decided it was time to study this unusual form of addiction. In 2012, we completed a retrospective review of our propofol cases to look for patterns in presentation, treatment course, and outcome. This paper was recently published in the *Journal of Addiction Medicine*.¹

Patient Characteristics

Several important patient characteristics emerged from the study. Female patients were over-represented in this group. Our propofol cohort most commonly reported that they began injecting propofol out of a desire for sleep. Other common reasons for using propofol were anxiety reduction and euphoria. Rather than propofol being a secondary drug of abuse, it was the patient's primary drug of choice in half of the cases. Alcohol use in our propofol cohort was strikingly low. Propofol addiction has a rapid downhill course, with the majority of cases (68%) presenting to treatment within four months of their first intravenous propofol injection. Fifty percent



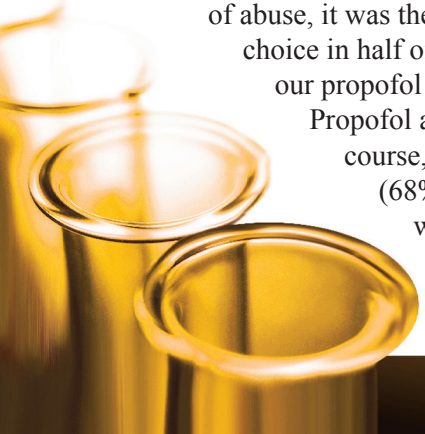
iStock photo / Model is not a known substance abuser or healthcare worker.

of our propofol group had propofol-related physical injury, including falling from tables, facial fractures and automobile accidents. A common injury pattern occurred when the user injected too much propofol while sitting at a desk. They would lose consciousness and hit the desktop face-first, producing facial contusions. We described this as "propofol head-banging."

Diagnostic Considerations

We were surprised to note that half of our users reported tolerance and several of our propofol dependent healthcare professionals reported withdrawal upon discontinuing propofol. Eighty percent of our cohort met three out of seven criteria for the diagnosis of sedative dependence, as outlined in the *Diagnostic and Statistical Manual of Disorders (DSM-IV)*. Almost 80% of the propofol group had a current or past history of a depressive disorder. Over 60% of our cases reported history of childhood abuse. Over 80% had a biological family history of substance dependence and almost 60% had a genetic history of depression.

One striking and important finding is the rapid increase in the incidence of propofol dependence among healthcare professionals. Over the 20 years of the study, there was a 25%
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USDTL Executives Host Distinguished Toxicologists

By Joseph Salerno, Scientific Copywriter, USDTL

USDTL was honored to host Dr. Christopher Chengelis and Professor Ron Koch, Ph.D. for a tour of our drug testing laboratories this summer. Dr. Chengelis recently retired as Vice President and Chief Scientific Officer of Will Research Labs in Ashland, OH. Mr. Koch is retired Professor of

Pharmaceutics for the University of Illinois College of Pharmacy, where he taught for more than 30 years. They were joined by Dr. Chengelis youngest son Alex, a recent college graduate for an afternoon baseball game between the Chicago White Sox and the Cleveland Indians.



From left to right: Veronica Lewis, Executive Vice-President, USDTL; Vicky Lewis, Sales and Marketing Associate, USDTL; Douglas Lewis, President and Scientific Director, USDTL; Dr. Christopher Chengelis, Vice President (ret.) of Will Research Labs; Ron Koch, Ph.D., Professor (ret.) of Pharmaceutics for the University of Illinois College of Pharmacy; and Alex Chengelis, enjoying a White Sox game at U.S. Cellular Field, Chicago, IL. USDTL photo.

USDTL Research News - Advancing The Gold Standard in Drug Testing

By Joseph Salerno, Scientific Copywriter, USDTL

USDTL Publishes Method Validation For The Detection of Marijuana Biomarkers in Fingernail And Hair Samples

Researchers at USDTL recently published a peer reviewed article explaining and validating the detection in hair and fingernail samples of THCA (11-nor-9-carboxy- Δ^9 -tetrahydrocannabinol), the primary metabolite of the psychoactive compound found in marijuana. The study used gas chromatography-tandem mass spectrometry instrumentation to validate a high sensitivity method of THCA measurement that utilizes the positive test cutoff proposed by the Substance Abuse and Mental Health Services Administration in the "Proposed Revisions to Mandatory Guidelines for Federal Workplace Drug Testing Programs."

The published study also compared fingernail and hair samples and found that fingernail was able to detect almost five times as much THCA concentration and also slightly more positive THCA results than hair samples. The research was able to demonstrate that nail samples are a suitable

alternative specimen type to hair for marijuana testing.

The findings were published in the October issue of the *American Journal of Analytical Chemistry*.
(doi: 10.4236/ajac.2013.410A2001)

USDTL Publishes Case Study of Long-term Urinary Propofol Glucuronide Detection

USDTL researchers recently demonstrated the long-term urinary profile of propofol glucuronide (PPFG) in a patient who had been administered the anesthetic propofol. USDTL's case study was able to demonstrate that PPFG is detectable in urine samples for up to 28 days following administration of an anesthetic dose of propofol. Previous to the USDTL case study, the longest observed urinary PPFG profile was six days. Propofol is currently the most widely used anesthesia in surgical rooms.

The findings were published in the October issue of the online journal *Pharmacology & Pharmacy*.
(doi: 10.4236/pp.2013.47076)

Ask the Toxicologist

Client Question:

I just want to know how a pg/mg measurement compares to a ng/ml measurement. What is the difference between reading a hair test result compared to an oral fluid result. The specific screen isn't really important. I'm just trying to figure out how it's all measured.

- Family Case Manager, Department of Child Services

USDTL Toxicologist Answer

The short answer is they do not correspond. One is a concentration measurement in a liquid (ng/mL) while the other is a concentration measurement in a solid (pg/mg). Hair, urine, and oral fluid are very different with respect to how much and for how long drug and metabolite may be detected, therefore a particular measurement in urine does not correspond at all to any value measured in hair. Each specimen type has a specific window of detection wherein a substance may be detected: yes it is present, or no it is not.

Client Question

Can you tell if the levels listed below would be considered high range? I want to know if these numbers would mean the donor is smoking methamphetamines on a regular basis or every so often.

Amphetamine Positive: 5389 pg/mg

Methamphetamine Positive: >10000 pg/mg

- Family Case Manager, Department of Child Services

USDTL Toxicologist Answer

High numbers can come from infrequent use, and low numbers can come from chronic overuse. Any time you are testing a reservoir matrix where drugs tend to collect, such as urine, hair, nails, or tissues, you cannot backtrack to determine time, dosage, or frequency. There are simply too many variables. What you have at the end of the day is an appropriate window of detection and a simple yes or no. Although you may want to increase the interpretation of this result from just a simple "positive" to "very positive", that would be incorrect. Any further interpretation based on the values is not supported by the scientific literature.

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increase in the numbers of patients admitted for treatment with propofol dependence in each sequential semi-decade. Looking carefully at the centers detection methods, some of this increase could be related to an improved surveillance for propofol dependence over the 20 year history of these cases. However, this effect is limited, we assert that the true incidence of propofol dependence is clearly on the rise.

Detection and Treatment

Several patterns emerged from our study. The first is there is a distinct diagnostic tetrad for propofol dependence. The criterion for the tetrad are: a) female gender, b) history of depression, c) childhood trauma, and d) propofol dependence. Using this tetrad, if a clinician learns of three of these criteria, they should look for the fourth. We believe that aggressive treatment of depression and trauma sequelae is critical for the best care of propofol-dependent professionals. During treatment, careful consideration should be made about returning to high propofol access environments. Like the opioid fentanyl, we believe that some (but not all) propofol dependent healthcare professionals should never return to high drug access work environments. Finally, ongoing and extended drug testing for propofol is an essential part of the long term care of propofol addicted professionals.

References:

1. Earley PH, Finver T. Addiction to propofol: a study of 22 treatment cases. *Journal of addiction medicine*. May-Jun 2013;7(3):169-176.

Dr. Paul H. Earley joined Talbott Recovery as Medical Director in late 2006. He has 20 years of experience treating addictive diseases and specializes in long-term therapy and advocacy for professionals who suffer from addictive diseases.

To contact the author:

Paul H. Earley, M.D., FASAM

Principal, Earley Consultancy, LLC

Medical Director, Georgia Physicians Health Program Inc. Atlanta, Georgia USA

paulearley@earleyconsultancy.com; paulearley.net

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Upcoming Events:

- December 5-8 – American Academy of Addiction Psychiatry 24th Annual Meeting and Symposium – Scottsdale, AZ

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