

STATE OF NEW HAMPSHIRE

COÖS, SS.

OCTOBER 2021

State of New Hampshire

v.

Volodymyr Zhukovskyy

214-2019-CR-78

**STATE’S MOTION TO LIMINE DR. EDWARDS SELLERS’ TESTIMONY**

NOW COMES the State of New Hampshire, by and through its attorneys, the Office of the Coös County Attorney and the Office of the Attorney General, and respectfully moves this Honorable Court to limit Dr. Edwards Sellers’ testimony to testimony about relevant toxicology generally and regarding the defendant’s toxicological results, and restrict him from testifying as to: (1) the defendant’s—or any other witness’s—veracity in any manner, including suggesting that any characteristics of the defendant or the facts of this case are demonstrative of the defendant’s veracity; (2) whether Albert Mazza was impaired or intoxicated; and (3) anything regarding the causation of the crash at issue, including whether the defendant’s toxicology contributed to the crash. In further support of this objection, the State says as follows:

**I. BACKGROUND**

1. On June 21, 2019, the defendant caused a motor vehicle crash that resulted in the deaths of seven people and serious bodily injury to another person, and placed numerous additional motorists in danger of serious bodily injury and death. The defendant was arrested

and charged with seven counts of negligent homicide on June 24, 2019. He currently stands charged with seven counts of manslaughter, seven counts of impaired negligent homicide, seven counts of negligent homicide, one charge of aggravated driving while intoxicated, and one charge of reckless conduct with a deadly weapon. Jury selection is scheduled to begin on November 16, 2021, with trial set for November 29, 2021.

2. The defendant has disclosed Dr. Edward Sellers as an expert in a “wide range of basic and clinical psychopharmacology and neuroscience.” Dr. Sellers has issued two reports. The first report is dated June 18, 2020, which the defendant provided to the State on June 19, 2020 (hereinafter the “June Report”). Dr. Sellers issued an addendum on December 18, 2020, which the defendant did not provide to the State until May 12, 2021 (hereinafter the “December Report”).<sup>1</sup> Dr. Sellers was deposed by the State on October 20, 2021 (hereinafter “deposition”).<sup>2</sup>

3. In his reports, Dr. Sellers reached several conclusions. Among others, Dr. Sellers concluded: (1) “The concentrations of drug in Mr. Zhukovskyy at the time of the accident are consistent with his report he snorted the drugs at about 8AM;” D2, D10; (2) “There were a number of factors beyond drugs that could have contributed to the accident. It is possible drugs and alcohol may have contributed to the accident;” Id.; and (3) that:

[T]here are a number of other nondrug factors that are more likely related to the causes of the accident

- lack of adequate sleep,
- being temporarily distracted,

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<sup>1</sup> Dr. Sellers testified at a deposition on October 20, 2021. When asked when he provided the reports to defense counsel, he indicated that while he was not sure the exact date he would assume he provided them near in time to when they were dated, and noted that he is very “efficient.”

<sup>2</sup> Due to the recency of Dr. Sellers’ deposition, in order to timely file this motion, the State’s references to his testimony are based upon counsels’ recollections and notes. The State can provide a copy of the State’s references to the transcript upon request by the Court.

- anticipation of getting home
- road configuration where there was relatively little time to avoid the accident,
- sub-clinical opiate withdrawal or withdrawal from another substance
- individual driving style
- The intrusion of the lead motorcycle onto the center line by its driver with a blood alcohol of 0.135
- Other unidentified human factors

D1745 (footnotes omitted). During his deposition, Dr. Sellers confirmed his support for those opinions, generally that the defendant was not impaired, and that other factors, independent of the defendant's drug use, contributed to the crash. During his deposition, Dr. Sellers expanded upon his opinion regarding Mr. Mazza and opined that Mr. Mazza was more at fault for the crash because he was over the legal limit of .08.

4. In addition to opining beyond the effects of the illicit drugs in the defendant's system, Dr. Sellers has also opined on the credibility of the defendant. For example, in his June report, Dr. Sellers opined that the defendant "reports he snorted the drugs at 8AM; in my experience drug abusers are truthful about when they take drugs." D9. During his deposition, Dr. Sellers indicated that he could not think of any reason that the defendant would lie and again stressed that in his experience drug users are honest. Likewise, in his December report, Dr. Sellers opined that the defendant's "agreement that 'cocaine must have been still working then because otherwise he would have been having a crash from not using since 8:00 am' is not credible." D1745. Dr. Sellers goes on to explain his rationale for his opinion that the defendant's statement was not credible, in part, because of a person's diminished "accuracy of recall several days later." Id.

5. With regard to the facts of this case, Dr. Sellers' conclusions in both reports are based upon his review of a discrete set of discovery materials. See June report, D4–D6.<sup>3</sup> Dr. Sellers did not review either of the defendant's recorded interviews, either the audio versions or the audio/video versions. Apparently, Dr. Sellers has had no personal contact with the defendant; he never interviewed him, has never reviewed any of the defendant's medical records, or conducted any studies on the defendant's metabolic rate, in general or specific to the illicit drugs that were in his system. Dr. Sellers conclusions regarding the defendant are solely focused on the toxicology results and the lack of observations by the law enforcement officers who he interacted with.

## **II. ARGUMENT**

6. While Dr. Sellers' testimony regarding the general toxicology of cocaine and opiates, including pharmacodynamics and drug metabolism, may arguably help educate the jury, to opine on any other topics, such as: (1) witness credibility; (2) the impairment of Albert Mazza; and/or (3) the causation of the crash at issue, is inappropriate and unfairly prejudicial. Without any limitation, Dr. Sellers' testimony would assign weight to the veracity of the defendant's out-of-court statements, and consequently any in-court testimony, thereby usurping the jury's role to determine the weight of the evidence and credibility to assign each witness. Moreover, testimony implying that the defendant told the truth about his drug use on the day of the crash would mislead the jury, as there is evidence that the defendant lied during the investigation about his drug use both generally and before the crash.

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<sup>3</sup> These reports are attached. The documents have been assigned paginated Bates numbers: D1–11 and D1743–1746. For ease of reference, the State has cited to the relevant Bates number.

7. It is a long standing and “well-recognized principle of our trial system that ‘determining the weight and credibility of a witness’s testimony belongs to the jury, who are presumed to be fitted for it by their natural intelligence and their practical knowledge of men and the ways of men.’” Nimely v. City of New York, 414 F.3d 381, 397 (2d Cir. 2005) (quoting Aetna Life Ins. Co. v. Ward, 140 U.S. 76, 88 (1891)) (ellipses omitted). The United States Supreme Court has recognized that “expert evidence can be both powerful and quite misleading because of the difficulty in evaluating it. Because of this risk, the judge in weighing possible prejudice against probative force under Rule 403 of the present rules exercises more control over experts than over lay witnesses.” Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 595 (1993); see also United States v. Rosales, 19 F.3d 763, 766 (1st Cir.1994) (“proffered expert testimony [c]ould create a substantial danger of undue prejudice . . . because of its aura of special reliability and trustworthiness”). These concerns are not limited to merely overt references by experts on a witnesses credibility, and is not more acceptable merely on the basis that an expert claims his opinion on veracity is based upon his unique qualifications and experience.

8. “[E]xpert opinions that constitute evaluations of witness credibility” are inadmissible, “*even when rooted in scientific or technical expertise.*” Nimely, 414 F.3d at 398 (emphasis added). Accordingly, the New Hampshire Supreme Court has “cautioned trial courts to be vigilant in ensuring that an expert’s testimony does not cross the line into the impermissible realm of vouching for the victim’s credibility.” State v. DeCosta, 146 N.H. 405, 409 (2001); see also United States v. Shay, 57 F.3d 126, at 134 n.6 (1995) (limitations on scope of expert psychological testimony can prevent impermissible jury inferences).

Other states have likewise sought to protect the sanctity of the jury from overzealous experts, who may attempt to opine on witness veracity.

9. In Commonwealth v. Polk, the defendant was convicted of the statutory rape of his minor niece. 965 N.E.2d 815, 818 (Mass. 2012). At trial, the defendant sought to introduce an expert in support of the theory that the victim’s “memory might be impaired because of a ‘dissociative memory’ disorder.” Id. at 820. The expert also intended to testify to the risk of confabulation arising from dissociative memory. Id. at 821. The trial court excluded the expert’s testimony. Id. at 822.

10. On appeal to the Supreme Judicial Court of Massachusetts, the Court agreed that the expert’s testimony about the general characteristics of dissociative memory disorder was admissible. Id. at 824–26. The Court, however, acknowledged that without certain limitations, the expert’s testimony would invade the province of the jury in determining credibility. The Court stated that “[n]o witness, expert or not, may offer an opinion as to the credibility of another witness.” Id. at 826. The Court explained, “Properly limited, such expert testimony does not intrude on the jury’s function of determining the credibility of witnesses.” Id. The expert’s testimony, however, would have crossed the line from permissible to impermissible testimony were he to explicitly have opined on the victim’s memory. Id. at 826–27.

11. In New Hampshire, this issue has arisen several times in the context of child sexual abuse cases. For example, in State v. Collins, the defendant was convicted of several sexual abuse charges. 166 N.H. 210, 211 (2014). During trial, a therapist distinguished the victim’s behaviors from a major depressive episode to post-traumatic stress disorder. Id. at 213. He then went further, testifying that her “behaviors ‘fit perfectly into the same kind of

behavioral symptoms that we would see for a child who had been sexually abused.”” Id. On appeal, the New Hampshire Supreme Court agreed that this type of expert testimony is improper. Id. The Court explained that it had “long held that testimony of a child sexual abuse victim’s specific behavior is inadmissible if its purpose is to prove that abuse occurred, or if the expert testifies that the particular victim’s behaviors were consistent with one who had been abused.” Id. at 214 (internal quotations and ellipses omitted).

12. Similarly, Dr. Sellers testimony beyond the characteristics of the defendant’s toxicology is improper, where his testimony is offered to imply that this particular defendant’s toxicology or drug user’s veracity in general, suggests the defendant was telling the truth. Even assuming that Dr. Seller’s postulation that the defendant was honest or likely honest—which he was not—does not necessitate a finding by the jury that the defendant was in fact honest. Cf. Cressey, 137 N.H. at 409 (finding that “while many of the factors considered by [the expert] . . . may accurately indicate that the children’s mental health [was] suffering to some degree, [they] do not necessitate a finding that the children [had] been sexually abused”). Therefore, Dr. Sellers must be restricted from assigning weight to the defendant’s statements, by implicitly suggesting to the jury that the defendant was in fact honest, or certain statements were not credible, thereby

13. For example, in Commonwealth v. Quinn, the defendant appealed his sexual assault related convictions to the Supreme Judicial Court of Massachusetts. He argued the trial court “erred by admitting in evidence . . . [the expert’s] testimony regarding the behavioral characteristics of sexual abuse victims because it implicitly vouched for the victim’s credibility regarding her sexual abuse allegations.” Comm. v. Quinn, 15 N.E.3d 726, 731 (Mass. 2014). At trial, the expert was asked to describe the victim’s demeanor during

her treatment. Id. 730. After the expert testified to her observations of the victim, she was asked to describe the general symptoms of a teenager who was sexually abused as a child. Id. The symptoms described regarding the victim and the general symptoms were similar. *See Id.*

14. The Massachusetts Supreme Judicial Court vacated the conviction, finding that the expert's testimony was "certainly impermissible where it suggested that the behavioral characteristics of the victim were consistent with those of sexual abuse victims." Id. at 733.

The Court held that:

Where a reasonable jury would have understood the victim's therapist, who had seen the victim regularly for nearly eight months and who had treated many child sexual abuse victims, to have suggested that the victim's behavioral characteristics were consistent with that of a child sexual abuse victim, we cannot say this expert testimony did not influence the jury's evaluation of the victim's credibility.

Id. The Court noted that "[e]ven where an expert does not directly compare the behavior of the complainant to that typical of sexually abused children, the expert's testimony may be inadmissible where a reasonable jury would think the expert was implicitly vouching for the credibility of the complainant." Id. at 731.

15. Accordingly, just as Dr. Sellers cannot be permitted to overtly testify to the veracity of the defendant—or any other witnesses—Dr. Sellers cannot be permitted to juxtapose his testimony about drug user's credibility generally or any other evidence, with specific descriptions and opinions of the defendant's truthfulness, veracity, or credibility. Any reasonable jury would certainly take such testimony to mean that the defendant was telling the truth or lying. "Such testimony impermissibly intrudes on the jury's province to assess the credibility of the witness." Id. (quotation omitted).

16. Dr. Sellers should also be prohibited from offering testimony on Mr. Mazza's toxicology. The only reference to Mr. Mazza's impairment in either of Dr. Sellers' reports was Mr. Mazza's blood alcohol level. See D10, D1745. At the deposition, Dr. Sellers testified that he believed Mr. Mazza was more at fault for the crash solely because he had a blood alcohol level above the legal limit. Beyond that opinion being legally unsound, Dr. Sellers provided no other evidence of Mr. Mazza's impairment beyond his blood alcohol concentration. While Mr. Mazza's blood alcohol concentration (BAC) may be relevant, an expert opinion that Mr. Mazza is legally impaired, simply because of his BAC, is unnecessary and inappropriate. "Even assuming such testimony were relevant, it is not admissible unless the trial court finds . . . that it will aid the jury." State v. Bennett, 144 N.H. 13, 22 (1999); see also N.H. R. Ev. 702 (explain that expert opinion evidence is only admissible, among other things, if it will "help the trier of fact to understand the evidence or to determine a fact in issue").

17. To the extent Dr. Sellers offers that Mr. Mazza was legally impaired because of his BAC, that concept is not outside the ken of the average juror. State v. St. Laurent, 138 N.H. 492, 495 (1994) (precluding expert from opining on *mens rea* because while the expert had the ability to form an opinion on *mens rea* it was "not beyond the ken of the average juror"). It is beyond common knowledge that a BAC above .08 is unlawful. The risk, similar to the arguments above regarding veracity, is that the expert's opinion will supplant the jurors ability and constitutional role to decide such facts.

18. Dr. Sellers should also be restricted from testifying to any pontification regarding the cause of the crash, including all of the factors listed in paragraph 3 *supra*, and whether the defendant contributed to the crash based upon his toxicology. Dr. Sellers does not purport

to be a crash reconstructionist and the defendant has not demonstrated that Dr. Sellers has any unique or specialized knowledge on crash causation, either through education or experience. Suffice to say that the defendant has the burden to prove that the expert's testimony is admissible under Rule 702, which he has not done. See 702(a). Likewise, Dr. Sellers reports are insufficient as to the factors discussed above to render his testimony on those factors admissible. An expert disclosure must consist of "the subject matter on which the expert is expected to testify, state a summary of the facts and opinions to which the expert is expected to testify and a summary of the grounds for each opinion . . . ." N.H. R. Crim. Pro. 12(b)4(B). With regard to the factors in paragraph 3 *supra*, Dr. Sellers reports are mere conclusory statements that do not satisfy Rule 12(b)4(B). See also N.H. R. Ev. 702(b)–(d) (requiring expert opinions to be based upon "sufficient facts or data," and premised on "reliable" principles and methods, both in practice and application). Accordingly, the defendant should not be allowed to testify to any of his conclusory opinions in paragraph 3.

WHEREFORE, the State of New Hampshire respectfully requests that this Honorable Court:

- A. Preclude Dr. Edward Sellers from testifying on the defendant's—or any other witness's—veracity in any manner, including suggesting that any characteristics of the defendant or the facts of this case are demonstrative of the defendant's veracity;
- B. Preclude Dr. Edward Sellers from testifying to whether Albert Mazza was impaired or intoxicated;
- C. Preclude Dr. Edward Sellers from testifying on the causation of the crash in any manner, including whether the defendant's drug use or any of the factors listed in paragraph 3 herein contributed to the crash; and
- D. Order such further relief as may be just and proper.

Respectfully submitted,

THE STATE OF NEW HAMPSHIRE

By its attorneys,

October 21, 2021

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CERTIFICATE OF SERVICE

I certify that this pleading has been provided to counsel of record, through the Superior Court's electronic filing system.

/S/ Scott D. Chase  
Scott D. Chase, Esq.



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## Expert Opinion: State v. Zhukovskyy

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Toronto, Canada  
for

Mr. Jay Duguay New Hampshire Public Defender's Office

18 June 2020

## **Executive Summary**

Drug concentrations of opiates like fentanyl cannot be used to predict individual driving performance or assign causality for an accident to the drug.

Mr. Zhukovskyy was not intoxicated at the time of the accident.

The concentrations of drug in Mr. Zhukovskyy at the time of the accident are consistent with his report he snorted the drugs at about 0800 h.

There were a number of factors beyond drugs that could have contributed to the accident. It is possible drugs and alcohol may have contributed to the accident.

## **Background**

I, Edward M. Sellers, M.D., Ph.D., have been retained as an expert in the matter of State v Zhukovskyy by Mr. Jay Duguay of the New Hampshire Public Defender's Office.

I have been asked specifically to offer an opinion on and to comment on:

1. Do drug concentrations of opiates or cocaine measured after an accident predict or correlate with driving impairment at the time of the accident?
2. Was Mr. Zhukovskyy "intoxicated" at the time of the accident?
3. Were the drug concentrations found in the blood of Mr. Zhukovskyy approximately 2 hours after the accident consistent with him having snorted heroin, fentanyl and cocaine approximately 12-13 hours previously?
4. What pharmacologic and other factors may have contributed to the accident involving Mr. Zhukovskyy and the motorcyclists?

## **Qualifications**

I attach a curriculum vitae which contains details of my background and qualifications. A summary biosketch follows:

### **Education and Training**

I received my M.D., with Honours, from The University of Toronto in 1965; my Ph.D. in pharmacology from Harvard Medical School in 1971; my Certification in Internal Medicine from the Royal College of Physicians and Surgeons of Canada and Board Certified in Internal Medicine in the United States as a Fellow of the American College of Physicians in 1972.

## Career activities

After completing my training in Boston, I accepted a position at the University of Toronto in the Departments of Pharmacology and Medicine (1972) and the Clinical Research Treatment Institute of the Addiction Research Foundation. Subsequently I held a number of research, clinical and administrative academic positions. For example, from 1978 to 1984, I was the Head of Medicine and Physician-in-Chief of the Clinical Institute of the Addiction Research Foundation. And from 1981 to 1984, I also served as the Director of the Clinical Institute. From 1991 to 1994, I was the Vice President of the Foundation's Clinical Research and Treatment Institute (see curriculum vitae).

When I began work at the University of Toronto and the Addiction Research Foundation (ARF), ARF was one of the world's foremost clinical research and treatment facilities for drug addiction, treating 30,000-50,000 patients each year. The ARF is now part of the Center for Addictions and Mental Health.

While at the Addiction Research Foundation and University I combined my training in Internal Medicine and Pharmacology to establish one of the world's foremost research, training and clinical programs in Clinical Pharmacology, specializing in psychopharmacology and drug abuse and addiction. As a result of this activity I have a deep understanding of drug dependence and have extensive experience in the treatment of drug and alcohol abuse.

My expertise covers a wide range of basic and clinical psychopharmacology and neuroscience. Much of our work has been focused on pharmacokinetics (the time course of drug concentrations in the blood, plasma or body), pharmacodynamics (measuring the effects of drugs such as drugs acting in the brain), and drug metabolism (how drugs are converted or metabolized in the body) and the assessment of whether drugs actually cause a specific drug-related event.

Specific to the issues in the matter of State v Zhukovskyy I have conducted studies in drug abusers to assess the metabolism of various opiates (e.g., codeine, morphine, fentanyl, oxycodone, hydromorphone), stimulants (e.g., cocaine, d-amphetamine, methamphetamine, methylphenidate, caffeine) and sedative hypnotics (e.g., barbiturates, diazepam, triazolam, alprazolam, lorazepam,). Many of these studies have included pharmacokinetic and concurrent measures of the effects of these drugs. I would estimate I have done more than 100 such studies. During the course of my work I have published various review articles concerning the relationship of drug concentrations pharmacokinetics and pharmacodynamics concerning drugs alone and in combinations.

As the result of this work I have authored more than 600 scientific papers that have been cited > 37,200 times (h index 85; i10 360) (Google Scholar accessed 02 June 2020).

## **Selected Awards and Honors**

I have been President of the American Society for Clinical Pharmacology and Therapeutics, the Canadian Society for Clinical Pharmacology and the College on the Problems of Drug Dependence. I have received numerous awards including the Nathan B. Eddy Award of the College of Problems on Drug Dependence recognizing contributions to research concerning drugs of abuse. I have also been named as an Honorary Fellow by the American College of Clinical Pharmacology. In 2014, I was the Oscar B. Hunter Awardee of the American Society of Clinical Pharmacology and Therapeutics. This is the most prestigious award given in clinical pharmacology and recognizes achievements in research, teaching and clinical care.

## **Declaration of Compensation and Conflicts of Interest**

For my work done on this matter, I am being compensated for my time at my usual hourly rate of \$550. I have no conflicts of interest to declare.

## **Documents Reviewed**

My opinion and comments are based on a review of the following documents. In addition, I have included several cited scientific papers in the text of my opinions

1. New Hampshire State Police Collision Analysis and Reconstruction Unit Report Narrative #CAR19-09674 Section 2, Trooper Andrew Wilensky, 23 September 2019 (74 printed pages)
2. New Hampshire State Police Collision Analysis and Reconstruction Unit Report Narrative #CAR19-09674 Section 3, Trooper Andrew Wilensky, 23 September 2019 (78 printed pages)
3. New Hampshire State Police Collision Analysis and Reconstruction Unit Report Narrative #CAR19-09674 Section 4, Trooper Andrew Wilensky, 13 September 2019 (24 printed pages)
4. New Hampshire State Police Continuation of Investigation Report #CAR19-9674 Interview with Volodymyr Zhukovskyy on 24 June 2019, TFC Shawn Torsey, 12 July 2019 (6 printed pages)
5. New Hampshire State Police Continuation of Investigation Report #CAR19-9674 Interview with Volodymyr Zhukovskyy on 21 June 2019, Sgt Michael Cote, 7 August 2019 (3 printed pages)
6. New Hampshire State Police Continuation of Investigation Report #CAR19-9674 Interview with Nicholas Belanger, TFC Amanda Johnson, 2 July 2019 (2 printed pages)
7. New Hampshire State Police Continuation of Investigation Report #CAR19-9674 interview with Stephen Piwowarski, TFC Shawn Torsey, 23 June 2019 (2 printed pages)

8. New Hampshire State Police Continuation of Investigation Report #CAR19-9674  
Interview with Annie Baron, TFC Shawn Torsey, 23 June 2019 (2 printed pages)
9. New Hampshire State Police Continuation of Investigation Report #CAR19-9674  
Interview with Brian Lamarre, Jonathan H. Stephens, 10 July 2019 (1 printed page)
10. New Hampshire State Police Continuation of Investigation Report #CAR19-9674,  
Michael J. McLaughlin, 6 July 2019 (6 printed pages)
11. . New Hampshire State Police Continuation of Investigation Report #CAR19-9674  
Interview with Lawrence and Holly Coulter, Michael J. McLaughlin, 6 July 2019 (3  
printed pages)
12. New Hampshire State Police Continuation of Investigation Report #CAR19-9674  
Interview with Anthony Plant, TFC Shawn Torsey, 2 July 2019 (1 printed page)
13. New Hampshire State Police Continuation of Investigation Report #CAR19-9674  
Interview with Manuel and Valerie Ribeiro, Jonathan Stephens, 10 July 2019 (4 printed  
pages)
14. New Hampshire State Police Continuation of Investigation Report #CAR19-9674, Sgt M.  
R. Favreau, 27 June 2019 (6 printed pages)
15. New Hampshire State Police Continuation of Investigation Report #CAR19-9674, A.J.  
Davis, 27 June 2019 (4 printed pages)
16. New Hampshire State Police Continuation of Investigation Report #CAR19-9674  
Interview with Sean Moynahan, Kempes Corbally, 22 July 2019 (2 printed pages)
17. New Hampshire State Police Continuation of Investigation Report #CAR19-9674,  
Michael R. Bruno, 30 June 2019 (2 printed pages)
18. New Hampshire State Police Continuation of Investigation Report #CAR19-9674, Tpr  
Derek Newcomb, 30 June 2019 (9 printed pages)
19. New Hampshire State Police Continuation of Investigation Report #CAR19-9674  
Interview with Valerie Ribeiro, Jonathan Stephens, 23 July 2019 (2 printed pages)
20. Report Narratives — CAR Unit Troopers, Trooper Andrew P. Vlfilensky, 21 June 2019  
(24 printed P3965)
21. New Hampshire State Police Continuation of Investigation Report #CAR19-9674  
Interview with David L. Bark, Jonathan H. Stephens, 10 July 2019 (2 printed pages)
22. Report of Laboratory Examination # 'IX19-1127, Subject: Volodymyr Zhukovskyyy,  
Darby A. Vanamburg and Lynn Casey, State of New Hampshire Department of Safety  
Division of State Police Forensic Laboratory, 23-24 June 2019 (9 printed pages)
23. Report of Laboratory Examination #TX19-1127, Subject: Volodymyr Zhukovskyyy  
NMS Labs Report, Carolyn Royer, State of New Hampshire Department of Safety  
Division of State Police Forensic Laboratory, 11 July 2019 (6 printed pages)
24. Narrative, Corporal Mitchell Doolan, Coos County Sheriff, 27 June 2019 (2 printed  
pages)
25. Narrative, Officer Norman A. Brown, Jefferson PD, 23 June 2019 (3 printed pages)

26. Coos County Department of Corrections Interdepartment Information Report, Cpl Covill, 26 June 2019 (2 printed pages)
27. State of New Hampshire v Volodymyr V. Zhukovskyy, the Crash Lab Inc, 14 February 2020 (35 printed pages)
28. Report by Donna M. Papsun, M.S., NMS Labs, 200 Welsh Road, Horsham, Pennsylvania 19044 DDAddin\_1588694570\_Papsun revised report.pdf March 4<sup>th</sup>, 2020

## Opinion and Assessment

### Do drug concentrations of opiates or cocaine measured after an accident predict or correlate with driving impairment at the time of the accident

While it is commonly assumed that concentrations of drugs that may impair performance can be used to infer or prove a causal relationship to impairment, this is rarely the case. The major reason for this is that one wants to know, in a specific individual, was a particular concentration at a specific point in time responsible for impaired driving or other performance impairment, not some generalization about on average could a particular drug contribute to impairment. As noted below, the pharmacokinetics of heroin, cocaine and fentanyl show very large inter-individual variation [1-6]. However more important than this pharmacokinetic variation are even larger variations in sensitivity in response to drugs such as opiates (e.g., morphine, codeine, fentanyl). The responses to opiates for example are determined by highly variable rates of entry into key brain areas, variation in receptor binding affinity and in intracellular signalling and action, and variations in sensitivity of different effects mediated by opiate actions (e.g., respiration, pupil diameter, cognition, motor performance, sedation etc.). Many of these are subject to numerous reasons to vary among individuals (e.g., ancestry and genetic differences), and in the case of opiates, the development of tolerance or a decrease in sensitivity to the drugs. Because these factors are so numerous and complex and largely unknown in a specific individual, drug concentration cannot be used to predict a degree of impairment. A variety of studies on overdoses and drug-impaired driving populations identify a wide range of drug concentrations associated with any of these outcomes [7, 8]. The presence of a drug is an “association”, but this is not useful in a context of chronic drug use and the combining of various drugs together. As noted below, layered on top of these pharmacokinetic and pharmacodynamic observations there are frequently other human factors that can impair driving and performance (e.g., fatigue)

As noted in Dr. Papsun’s report and its source documents, clear evidence exists Mr. Zhukovskyy used heroin, fentanyl, and cocaine on the day of the accident. Mr. Zhukovskyy indicated he used these drugs at about 8 AM. The analysis of a sample taken at 2033 on the day of the accident indicated fentanyl, its metabolite norfentanyl, and a fentanyl analog acetylfentanyl at concentrations of 6.7, 3.3 and 0.33 ng/mL respectively; morphine at 21 ng/mL; benzoylecgonine was also detected. A repeat analysis later indicates similar morphine concentration but also

identified 6- monoacetylmorphine (6-MAM), a heroin metabolite. Fentanyl is commonly substituted for heroin or added to it. Heroin is rapidly converted to morphine and 6-MAM[2]. Benzoylcegonine is a metabolite of cocaine that persists in the blood longer than cocaine, which is very rapidly metabolized.

### **Was Mr. Zhukovskyy “intoxicated” at the time of the accident**

In her revised report Dr. Papsun concludes *that*

*“In summary, based upon the submitted documents and records, as well as my knowledge, education and training in forensic toxicology, it is my opinion, that Mr. Zhukovskyy’s actions are consistent with that of intoxication with the drugs found in his system, which included heroin/morphine, fentanyl, and acetylfentanyl. Mr. Zhukovskyy’s driving behavior is consistent with “on the nod” behavior, which is characteristic of narcotic analgesics, which included failure to maintain his lane, crossing center lines multiple times, and striking the motorcycles without evasive maneuvers; these drugs can be responsible for the production of the observed impairment, especially in the absence of another more competent cause.”*

If Mr. Zhukovskyy was experiencing overt impairment due to the substances found in his blood, that impairment or “on the nod” behavior would have been readily observable. There is no evidence that any indications of typical drug related impairment were observed by any witnesses, including numerous police officers, who had personal contact with Mr. Zhukovskyy over several hours following the accident. Similarly, there are no reports of overt drug withdrawal symptoms or signs.

The basis for my opinion is:

My Zhukovskyy claims to have taken the drugs approximately 12-13 hours before the time the blood was taken. I found no evidence to the contrary. The presence of benzoylcegonine, the persistent metabolite from the cocaine used at the same time but with no cocaine, supports Mr. Zhukovskyy’s claim, since he indicated he was using cocaine in part to offset the effects of the heroin-fentanyl and at the same time. In addition, Mr. Zhukovskyy indicates he was also using Red Bull (a caffeinated beverage) for the same purpose. Parenthetically, I note that caffeine concentrations were not measured in Mr. Zhukovskyy.

“Intoxication” is a phenomenon associated with the early and acute use of heroin with or without fentanyl. It is a general term that conveys that a substance (e.g. drug or alcohol) may have impaired the individual. Impairment can not be assessed or inferred by drug levels in the blood alone. To do this one needs direct observation of the individual, and to identify sufficient sleepiness, unsteadiness, confusion, impaired thinking, impaired coordination or motor control

etc., drug effects that can be reasonably inferred to have a potential effect on driving or performance of other tasks.

Numerous witnesses, including police highly experienced in assessing intoxicated and impaired drivers, failed to note any evidence of impaired thinking (cognition), memory, motor coordination, sleepiness, euphoria, or irrational behavior. If impairment or intoxication were suspected I would have expected the supervising officers to have performed appropriate roadside testing to detect impairment.

In this case there is no need to invoke “intoxication” on its own as the explanation of the accident and Mr. Zhukovskyy’s contribution to it. Contrary to Dr. Papsun’s assertion of “*absence of another more competent cause*” many human factors known to be associated with motor vehicle accidents are identified in the various interviews and notes and accident site assessment (e.g., lack of adequate sleep, being temporarily distracted, road configuration where there was relatively little time to avoid the accident, the intrusion of the lead motor cycle onto the center line.)

**Were the drug concentrations found in the blood of Mr. Zhukovskyy approximately 2 hours after the accident consistent with him having ingested, snorted or injected heroin, fentanyl and cocaine approximately 12-13 hours previously?**

Yes, they were.

The toxicologic findings are consistent with Mr. Zhukovskyy having snorted heroin mixed with fentanyl and cocaine. Fentanyl concentrations of 6.7ng/ml were measured on a blood sample taken from Mr. Zhukovskyy at 2033h. The accident occurred at 1827 h.

Similar fentanyl concentrations have been reported in other motor vehicle accidents where drugs are involved. [9]. However, these concentrations are associations with accidents, not evidence of causing the accident.

Answering the question of whether these concentrations, measured approximately 12.5 hours after the reported use, are consistent depends on the actual rate of metabolism or elimination of the fentanyl in the blood of Mr. Zhukovskyy. By knowing exactly how quickly an individual metabolizes a drug we can assess the likelihood that the claim of when drug was taken is correct. For example, this can be assessed by knowing the half-life of the fentanyl. The half-life of a drug is the time that it takes for the drug concentration in blood or plasma to decrease by 50%. The half-life of fentanyl is extremely variable in humans – it is affected by body size and composition, age, concurrent diseases (e.g., liver), sex, source of sample (arterial/venous), plasma protein binding (total drug concentrations are measured in the laboratory), and clearance of drug (amount removed per unit time). In Mr. Zhukovskyy’s case we know some of these, but we do not know and can not predict how fast he actually metabolized the drug. Knowing average

rates in the population is a rough guide. Mr. Zhukovskyy reports he snorted the drugs at 8AM; in my experience drug abusers are truthful about when they take drugs. He also reports he was able to drive so we can assume he was not seriously impaired. Several factors are important in this specific case – he was a heavy drug user of opiates (heroin-fentanyl) and therefore would have been likely very tolerant to the drug effects – this means that he would tolerate much higher doses of the drug than a drug-naïve individual. A second factor is that he concurrently snorted cocaine – this combination (“speed-balling”) is taken because it produces a desired high and the stimulant effects of the cocaine can offset any sedating or other effects of heroin-fentanyl on its own.

Fentanyl pharmacokinetics have been extensively studied [3-6]. One review article of 7 studies with a total of 50 subjects indicates a range of drug half lives of 2.4 to 14.2 hours (mean 5.4 h  $\pm$  SD 14.9) [5]. Another paper in 9 subjects reports a half life range of 3.1 to 6.7h (mean 4.4.h  $\pm$  SD 1.2). Extrapolating back to approximately 8AM from the 6.7 ng/ml at 2033h the expected peak fentanyl concentrations at 8Am or at time of peak drug concentrations (shortly after 8AM

Scenario A	Reilly[5]	T ½ h	Possible concentration at 0800 ng/ml
	Mean (average) t1/2	5.4	14.9
	Shortest t1/2	3.1	26.1
	Longest t 1/2	14.2	7.9
Scenario B	McClain[4]		
	Mean (average) t1/2	4.4	18.1
	Shortest t1/2	3.1	26.1
	Longest t 1/2	6.7	12.1

For simplicity, if we assume Mr. Zhukovskyy has an average half-life (4.4-5,4 h), his anticipated well-tolerated post drug concentrations of 15-18 ng.ml have been observed in surgical patients, opiate tolerant individuals, and shown in a variety of pharmacokinetic models to occur. Fatalities record much higher concentrations in many cases but even in these analyses the range of concentration is very wide. [10]

## What pharmacologic and other factors may have contributed to the accident involving Mr. Zhukovskyy and the motorcyclists?

As noted earlier, the concentrations of drugs in this case cannot be used to assign an exact causal role to the drugs. There are no on-site or clinical observations to suggest Mr. Zhukovskyy was intoxicated.

The various interviews, notes and accident site assessment identified factors which may have contributed to Mr. Zhukovskyy's role in the accident [11]

- lack of adequate sleep,
- being temporarily distracted,
- anticipation of getting home
- road configuration where there was relatively little time to avoid the accident,
- sub-clinical opiate withdrawal or withdrawal from another substance
- individual driving style [12]

The intrusion of the lead motorcycle onto the center line by its driver with a blood alcohol of 0.135 clearly contributed to the overall accident.

## Conclusions

Drug concentrations of opiates like fentanyl cannot be used to predict individual driving performance or assign causality for an accident to the drug

Mr. Zhukovskyy was not intoxicated at the time of the accident

The concentrations of drug in Mr. Zhukovskyy at the time of the accident are consistent with his report he snorted the drugs at about 8AM

There were a number of factors beyond drugs that could have contributed to the accident. It is possible drugs and alcohol may have contributed to the accident.

*Respectfully submitted*



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## **Addendum Expert Opinion: State v. Zhukovskyy**

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**18 December 2020**

## Executive Summary

Neither cocaine nor benzoylecgonine were affecting Mr. Zhukovskyy's driving at 626 pm.

## Report Addendum

Further to my original report (18 June 2020), I was asked on 30 October 2020 for my opinion on the matters described below:

*“According to Mr. Zhukovskyy, he consumed approximately ½ gram of cocaine at approximately 8:00 in the morning on the day of the accident along with two “small bags” of heroin. He insufflated both the cocaine and heroin. The accident occurred at approximately 6:26 in the evening on the same day. The blood sample taken at 8:37 pm tested positive for benzoylecgonine at 1058 ng/ml +/- 159 ng/ml. The blood tested negative for cocaethylene and cocaine. During a police interview on June 24, 2019 he repeatedly told investigators that he felt fine at the time of the accident. Detectives told him that the cocaine must have been still working then because otherwise he would have been having a crash from not using since 8:00 am, and Mr. Zhukovskyy agreed.*

*We would like you to provide an addendum to your initial report to provide additional information about the result for benzoylecgonine and its effect on impairment or ability to drive. Also, assuming Mr. Zhukovskyy was experiencing the effects of cocaine at the time of the accident, how would it likely have affected his ability to drive the vehicle, if at all”. (Excerpt from email instruction from Mr. Jay Duguay 30 Oct 2020)*

## Opinion and Assessment

**“....provide additional information about the result for benzoylecgonine and its effect on impairment or ability to drive.**

Cocaine is rapidly metabolized to two major metabolites benzoylecgonine (BE) and ecgonine methyl ester (EME) and minor metabolites[1-3]. Cocaethylene is a cocaine metabolite found after concurrent cocaine and alcohol use. Cocaine has a plasma half life of 70-90 minutes whereas benzoylecgonine has a half life of about 6 hours[2, 4]. The reported absence of cocaine and a blood benzoylecgonine concentration of 1058 ng/ml +/- 159 ng/ml approximately 12 hours after reported use of cocaine is entirely consistent with the known metabolism of cocaine and would not be inconsistent with the report of using half a gram at about 8 am. Twelve hours after using would mean about 8-10 half-lives will have elapsed for cocaine and <1% would remain – this would be below the limit of analytic detection and would be a concentration that has no effects on performance such as driving. In contrast for BE as much as 25% would remain with only about 2 half lives having elapsed. There are no data to suggest that BE has effects on driving performance.

Reference have been made that abstinence from or the offset of cocaine effects (sometimes referred to in this case with jargon such as “crashing”) is associated with impaired driving[5]. While heavy chronic cocaine users may shown some neurocognitive changes the relevance of these to driving is entirely speculative [6]. Parenthetically, I note that “crashing” is a street term with no precise scientific or precise factual basis. The terminology infers a potentially severe physiologic reaction which is dangerous. It is used very loosely to describe a range of signs and symptoms and situations ranging from very mild subjective symptoms to actual discontinuation syndrome or merely a desire to use more drug. A desire to use drug is not associated with any serious physiologic or behavioral or performance decrement.

**“.... Assuming Mr. Zhukovskyy was experiencing the effects of cocaine at the time of the accident, how would it likely have affected his ability to drive the vehicle, if at all”**

The Mr. Zhukovskyy’s agreement that “cocaine must have been still working then because otherwise he would have been having a crash from not using since 8:00 am” is not credible. Putting aside the accuracy of recall several days later the facts are that cocaine was not detected in his blood. The reason seems clear – he used the drug almost 10.5 hours before the accident. As for “crashing” affecting his driving as noted above there are no scientific data to support the importance of not taking a cocaine to causation of accidents.

Cocaine when present in active amounts may be associated with improved performance in some respects and but may be associated with a tendency to reckless driving [5].

As I noted in my original opinion there are a number of other nondrug factors that are more likely related to the causes of the accident. These include:

- lack of adequate sleep,
- being temporarily distracted,
- anticipation of getting home
- road configuration where there was relatively little time to avoid the accident,
- sub-clinical opiate withdrawal or withdrawal from another substance
- individual driving style [7]
- The intrusion of the lead motorcycle onto the center line by its driver with a blood alcohol of 0.135
- Other unidentified human factors [4]

I am aware that a revised accident report indicates Mr. Zhukovskyy did take actions to try to avoid the accident.

## Conclusions

Cocaine was not affecting Mr. Zhukovskyy’s driving at 626 pm

Benzoylcegonine was not affecting Mr. Zhukovskky's driving at 626 pm

"Crashing" from not taking cocaine was not affecting Mr. Zhukovskky's driving at 626 pm

*Respectfully submitted*



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