

Analysis of the autopsy report performed on Kielee Rustici (date of death: March 2, 2025)

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Dear Ms. Payton:

At your request, I have reviewed the autopsy report for Keilee Rustici dated April 10, 2025. My findings are below.

Summary: The cursory nature of the death scene investigation, coupled with errors by medical examiner, led to erroneous conclusions regarding the cause of death of Keilee Rustici. The conclusion that mitragynine toxicity contributed to death lacks a basis in scientific fact.

Analysis: No evidence points to the recent ingestion of kratom by Ms. Rustici. Overdose deaths overwhelmingly occur soon after ingestion of oral opioids; because opioids decrease gut motility, insoluble material such as the kratom plant matter ingested by Ms. Rustici would be expected to be found in the stomach. None was. The absence of kratom plant matter in Ms. Rustici's gastrointestinal tract is critical because scene investigators identified only kratom plant product in the home but no extracts, elixirs, or alternative formulations. Because Ms. Rustici's last kratom use was therefore likely distant to her death, kratom was likely not responsible for her death.

The rigorous assessment of a decedent's medical history, recognized as critically important in forensic investigations by the National Association of Medical Examiners and the American College of Medical Toxicology, was inadequate. Death scene investigators identified Ms. Rustici's noncompliance with medical care as one reason for obtaining an autopsy. Even though the ways in which Ms. Rustici was not compliant with her medical care were not described, the medical examiner failed to investigate other possible causes of death in his deliberations. That Ms. Rustici suffered from several chronic conditions (eg, Ehlers-Danlos syndrome, POTS disease, depression, nicotine use by vape) is well documented, yet forensic staff conducted only a cursory evaluation of Ms. Rustici's health history, including substance abuse history. The NAME/ACMT best practices publications indicate that a deep understanding of a deceased person's medical history is essential to eliminating other causes of death that are more plausible than putative opioid poisoning.

Similarly, Ms. Rustici had lived in the home where she died for only a short period of time. The death scene investigator noted that 'family problems' were the cause of her moving out of her own home, but no further investigation was performed to determine why her previous housing was unsustainable. The cursory evaluation into Ms. Rustici's social history further erodes confidence in the medical examiner's findings.

The medical examiner did not consider the pharmacokinetics and toxicokinetics of mitragynine in his assessment. Mitragynine undergoes postmortem redistribution so that concentrations of mitragynine measured at autopsy are approximately three times premortem values. Even if mitragynine concentrations do not increase after death, a concentration of 3100ng/mL is not elevated. A review of the peer-reviewed medical literature demonstrates that mitragynine concentrations as high as 22,800 are well tolerated, with no evidence of respiratory depression, cardiac abnormalities, nor neurotoxicity. In his assessment, therefore, the medical examiner makes the classic error of presuming that a concentration of a xenobiotic measured at

autopsy contributed to death when the scientifically correct approach is that the xenobiotic concentration is *associated* with death.

The postmortem concentration of opioid-like agents is useful for determining *exposure* but not *poisoning*. Stated another way, the presence of a substance on forensic testing suggests (because of the presence of false positive results) that a person used a substance, not that it killed him/her. In fact, NAME/ACMT developed their ‘Best Practices’ because medical examiners erroneously assumed that substances have a “lethal” threshold beyond which death must occur. This is simply untrue, because of the potential for tolerance. The medical examiner could not determine, based upon any concentration of mitragynine, that mitragynine was the cause of Keilee Rustici’s death.

The medical examiner also failed to consider the recognized limitations of forensic testing. Laboratory tests, particularly when performed by commercial forensic testing corporations, cannot detect all substances used by a decedent. Research from Colorado found that even in deaths attributed solely to mitragynine, more rigorous testing found the presence of *additional* substances that more plausibly contributed to death.

For the medical examiner’s contention—that mitragynine somehow contributed to Ms. Rustici’s death—to be correct, the manner in which mitragynine produces death must be known.¹ The toxidrome of mitragynine remains unknown.² Because the toxidrome is unknown, the concentration of mitragynine capable of producing this hypothesized toxidrome—and, hence, death—is unknown as well. To suggest, therefore, that mitragynine toxicity contributes to death lacks a basis in scientific fact.

Conclusion: The autopsy performed on Kielee Rustici lacked sufficient rigor and contained several errors that call into question the medical examiner’s determination that the cause of death was mitragynine toxicity.

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¹ The “toxidrome” is the consistent pattern of clinical findings associated with a particular class of drug. For example, the opioid toxidrome includes stupor and decreased ventilatory responsive to hypercapnia measured as decreased respiratory rate—none of which occurs even at striking mitragynine concentrations.

² Opioids affect the body’s respiratory response to rising blood carbon dioxide concentrations; this is most commonly measured as a decreased respiratory rate culminating in apnea. Although mitragynine has been known for over 50 years to have limited effects on respiration, the most recent research proves that mitragynine stimulates—not decreases—respirations .