Common Sense Initiative

Mike DeWine, *Governor*
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Proposed Classification of Mitragynine as a Schedule I Controlled Substance

Date Issued: 1/7/2026
Comments Due: 1/28/2026

The following information is being provided pursuant to the requirements of Senate Bill 2 of the 129th General Assembly, which require state agencies, including the Ohio Board of Pharmacy, to draft rules in collaboration with stakeholders, assess, and justify an adverse impact on the business community (as defined by S.B. 2), and provide an opportunity for the affected public to provide input on the following rule.

Comments on the proposed rule will be accepted until close of business on **January 28, 2026**.

Comments must be submitted electronically using this online comment form: **www.pharmacy.ohio.gov/MITcomment**. Copies of these comments will be provided to the Common Sense Initiative.

IMPORTANT: This proposed rule bans the sale and possession of mitragynine, the primary psychoactive alkaloid found in the Mitragyna speciosa plant, commonly known as kratom.

Business Impact Analysis

Agency, Board, or Commission Name: Ohio Board of Pharmacy

Rule Contact Name and Contact Information: Summer Reyburn, contact@pharmacy.ohio.gov

Regulation/Package Title (a general description of the rules' substantive content):

Mitragynine

Rule Number(s): 4729:9-1-01.2

Date of Submission for CSI Review: 1/7/2026

Public Comment Period End Date: 1/28/2026

Rule Type/Number of Rules:

New/ 1 rules

No Change/____ rules (FYR? ___)

Amended/____ rules (FYR? __)

Rescinded/____ rules (FYR? ___)

The Common Sense Initiative is established in R.C. 107.61 to eliminate excessive and duplicative rules and regulations that stand in the way of job creation. Under the Common Sense Initiative, agencies must balance the critical objectives of regulations that have an adverse impact on business with the costs of compliance by the regulated parties. Agencies should promote transparency, responsiveness, predictability, and flexibility while developing regulations that are fair and easy to follow. Agencies should prioritize compliance over punishment, and to that end, should utilize plain language in the development of regulations.

Reason for Submission

1. **R.C. 106.03 and 106.031 require agencies, when reviewing a rule, to determine whether the rule has an adverse impact on businesses as defined by R.C. 107.52. If the agency determines that it does, it must complete a business impact analysis and submit the rule for CSI review.**

Which adverse impact(s) to businesses has the agency determined the rule(s) create?

The rule(s):

a. ☐ Requires a license, permit, or any other prior authorization to engage in or operate a line of business.

b. ☒ Imposes a criminal penalty, a civil penalty, or another sanction, or creates a cause of action for failure to comply with its terms.

c. ☐ Requires specific expenditures or the report of information as a condition of compliance.

d. ☒ Is likely to directly reduce the revenue or increase the expenses of the lines of business to which it will apply or applies.

Regulatory Intent

2. Please briefly describe the draft regulation in plain language.
Please include the key provisions of the regulation as well as any proposed amendments.

Classifies mitragynine, the primary psychoactive alkaloid found in the Mitragyna speciosa plant, commonly known as kratom, as a Schedule I controlled substance.

3. Please list the Ohio statute(s) that authorize the agency, board or commission to adopt the rule(s) and the statute(s) that amplify that authority.

The proposed rule is authorized by sections 3719.44 and 3719.41 of the Ohio Revised Code.

4. Does the regulation implement a federal requirement? Is the proposed regulation being adopted or amended to enable the state to obtain or maintain approval to administer and enforce a federal law or to participate in a federal program?
If yes, please briefly explain the source and substance of the federal requirement.

The rule does not implement a federal requirement.

5. If the regulation implements a federal requirement, but includes provisions not specifically required by the federal government, please explain the rationale for

exceeding the federal requirement.

This rule package exceeds federal requirements as section 3719.44 of the Ohio Revised Code authorizes the Board to add or transfer a compound, mixture, preparation, or substance to Schedule I when it appears that there is a high potential for abuse, that it has no accepted medical use in treatment in this state, or that it lacks accepted safety for use in treatment under medical supervision. The Board is also charged with maintaining Ohio's Controlled Substances Schedules (see ORC 3719.41).

6. **What is the public purpose for this regulation (i.e., why does the Agency feel that there needs to be any regulation in this area at all)?**

Section 3719.44 of the Ohio Revised Code authorizes the Board to add or transfer a compound, mixture, preparation, or substance to Schedule I when it appears that there is a high potential for abuse, that it has no accepted medical use in treatment in this state, or that it lacks accepted safety for use in treatment under medical supervision. To meet this standard the Board must consider the following factors:

(1) The actual or relative potential for abuse;
(2) The scientific evidence of the pharmacological effect of the substance;
(3) The state of current scientific knowledge regarding the substance;
(4) The history and current pattern of abuse;
(5) The scope, duration, and significance of abuse;
(6) The risk to the public health;
(7) The potential of the substance to produce psychic or physiological dependence liability; and
(8) Whether the substance is an immediate precursor.

The Board's 8-Factor analysis is included as Appendix A of this document.

7. **How will the Agency measure the success of this regulation in terms of outputs and/or outcomes?**

The success of the regulations will be measured by the removal of mitragynine (kratom) products and a reduction in adverse events associated with these products.

8. **Are any of the proposed rules contained in this rule package being submitted pursuant to R.C. 101.352, 101.353, 106.032, 121.93, or 121.931?**

If yes, please specify the rule number(s), the specific R.C. section requiring this submission, and a detailed explanation.

No.

Development of the Regulation

9. Please list the stakeholders included by the Agency in the development or initial review of the draft regulation.
If applicable, please include the date and medium by which the stakeholders were initially contacted.

Stakeholders who were initially consulted during the development of the rule include: law enforcement, parents/families of individuals impacted by mitragynine and mitragynine-related compounds, regulators in other states, statewide organizations, local governments, state agencies, industry stakeholders, the US Food and Drug Administration, and addiction medicine professionals. Consultation began the in Fall of 2025.

Additionally, the Board received feedback from the public and industry stakeholders when the Governor announced his initial request for scheduling in August and when the Board adopted emergency rule OAC 4729:9-1-01.1 on December 12, 2025.

10. What input was provided by the stakeholders, and how did that input affect the draft regulation being proposed by the Agency?

The Board did not make any adjustments to the proposed rule.

11. What scientific data was used to develop the rule or the measurable outcomes of the rule? How does this data support the regulation being proposed?

Scientific data was used to develop this rule. The Board's 8-Factor analysis, which includes data supporting the rule, is included as Appendix A of this document.

12. What alternative regulations (or specific provisions within the regulation) did the Agency consider, and why did it determine that these alternatives were not appropriate? If none, why didn't the Agency consider regulatory alternatives?
Alternative regulations may include performance-based regulations, which define the required outcome, but do not dictate the process the regulated stakeholders must use

to comply.

Based upon a review of the 8-Factor analysis, the Board determined mitragynine has a high potential for abuse, has no accepted medical use in treatment in this state, and it lacks accepted safety for use in treatment under medical supervision. The Board's 8-Factor analysis is included as Appendix A of this document.

This rule represents an outcome-based regulation, as it does not specify the process necessary to meet the required outcome.

It should be noted that, in 2019, Utah developed a regulatory scheme that allowed continued access to kratom over-the-counter. Despite age restrictions and limited alkaloid access, overdose deaths related to kratom and treatment for kratom use disorder persisted. One emergency room physician reported patients sharing that they "had no idea it was just like a narcotic," and that his patients experience the same withdrawal symptoms as those withdrawing from narcotics. Consequently, the Utah legislature proposed to add all alkaloids from kratom and their analogs to the state's list of controlled substances in November 2025. The bill sponsor originally voted to regulate kratom in 2019 but now "sees kratom in all forms as a dangerous opioid masquerading as a supplement." (See Appendix A for more information)

13. What measures did the Agency take to ensure that this regulation does not duplicate an existing Ohio regulation?

The Board's Chief Legal Counsel reviewed the proposed rule to ensure that the regulation does not duplicate another Ohio Board of Pharmacy regulation.

14. Please describe the Agency's plan for implementation of the regulation, including any measures to ensure that the regulation is applied consistently and predictably for the regulated community.

The Board will develop guidance to ensure compliance with the rule. It will mirror existing guidance for a recent emergency rule banning mitragynine-related compounds (www.pharmacy.ohio.gov/7OHnotice).

In addition, the rule will be posted on the Board of Pharmacy's web site, information concerning the rule will be included in materials e-mailed to licensees, and notices will be sent to law enforcement parters, crime labs, associations, media, and individuals who sign up for the Board's email updates.

Board of Pharmacy staff are also available via phone or email to answer questions regarding implementation of the rule.

Adverse Impact to Business

15. Provide a summary of the estimated cost of compliance with the rule(s). Specifically, please do the following:

a. Identify the scope of the impacted business community, and

Retailers, gas stations, convenience stores, head/vape shops, and internet retailers that sell products containing mitragynine as well as distributors and manufacturers of these products.

b. Quantify and identify the nature of all adverse impact (e.g., fees, fines, employer time for compliance, etc.).

The adverse impact can be quantified in terms of dollars, hours to comply, or other factors; and may be estimated for the entire regulated population or for a representative business. Please include the source for your information/estimated impact.

Violation of this rule could result in criminal penalties under Ohio's drug laws (ORC 2925). Businesses will be prohibited from selling kratom (mitragynine) products.

A recent report from Case Western Reserve University's Prevention Research Center for Healthy Neighborhoods found over 130 stores carrying kratom products in the City of Cleveland. The economic impact on these businesses is dependent on the number of kratom products sold compared with other non-kratom products sold by these stores.

Additionally, an analysis conducted by the Board determined that there are at least 12 stores in Ohio that specifically specialize in the sale of kratom. This rule may result in the closure of these businesses, if their primary source of revenue is the sale of kratom.

16. Are there any proposed changes to the rules that will reduce a regulatory burden imposed on the business community? Please identify. *(Reductions in regulatory burden may include streamlining reporting processes, simplifying rules to improve readability, eliminating requirements, reducing compliance time or fees, or other related factors).*

No.

17. Why did the Agency determine that the regulatory intent justifies the adverse impact to the regulated business community?

Based upon a review of the 8-Factor analysis, the Board determined mitragynine has a high potential for abuse, has no accepted medical use in treatment in this state, and it lacks accepted safety for use in treatment under medical supervision. The Board's 8-Factor analysis is included as Appendix A of this document.

Of note, the analysis raises significant public health concerns related to the availability of mitragynine products. This includes liver toxicity, seizures, heavy metal poisoning, substance use disorder, neonatal abstinence syndrome, and, in some cases, death.

Regulatory Flexibility

18. Does the regulation provide any exemptions or alternative means of compliance for small businesses? Please explain.

This rule does not provide any exemptions or alternative means of compliance for small businesses. The law does not differentiate on the size of the business that may be engaged in the sale of Schedule I controlled substances.

19. How will the agency apply Ohio Revised Code section 119.14 (waiver of fines and penalties for paperwork violations and first-time offenders) into implementation of the regulation?

This rule imposes criminal penalties under ORC 2925. The Board has no legal authority to waive any fines or penalties associated with violations of the rule.

20. What resources are available to assist small businesses with compliance of the regulation?

The Board will develop guidance to ensure compliance with the rule. It will mirror existing guidance for a recent emergency rule banning mitragynine-related compounds (www.pharmacy.ohio.gov/7OHnotice).

4729:9-1-01.2 – Mitragynine (NEW)

Notwithstanding any other provision of the Administrative Code, the following is classified as a schedule I controlled substance opiate or opiate derivative:

(A) Mitragynine ((αE,2S,3S,12bS)-3-ethyl-1,2,3,4,6,7,12,12b-octahydro-8-methoxy-α-(methoxymethylene)-indolo[2,3-a]quinolizine-2-acetic acid, methyl ester) and / or synthetic substances, derivatives, prodrugs, isomers, esters, ethers, salts, and salts of isomers with similar chemical structure.

Board of Pharmacy

Pharmacy.Ohio.gov

Mike DeWine, *Governor* Jim Tressel, *Lt. Governor* Steven W. Schierholt, *Executive Director*

Classification of Mitragynine as a Schedule I Controlled Substance

Section 1: Summary

The Ohio Board of Pharmacy (Board), pursuant to section 3719.44 of the Ohio Revised Code, proposes the placement of mitragynine, the primary psychoactive alkaloid found in the Mitragyna speciosa plant, commonly known as kratom, into Schedule I.

Section 2: Background

Pursuant to section 3719.44 of the Ohio Revised Code, the Board may add or transfer a compound, mixture, preparation, or substance to Schedule I when it appears that there is a high potential for abuse, that it has no accepted medical use in treatment in this state, or that it lacks accepted safety for use in treatment under medical supervision.

In making a determination to add an unscheduled compound, the Board is required to consider the following 8 criteria:

(1) The actual or relative potential for abuse;
(2) The scientific evidence of the pharmacological effect of the substance;
(3) The state of current scientific knowledge regarding the substance;
(4) The history and current pattern of abuse;
(5) The scope, duration, and significance of abuse;
(6) The risk to the public health;
(7) The potential of the substance to produce psychic or physiological dependence liability; and
(8) Whether the substance is an immediate precursor.

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Section 3: Evaluating Mitragynine Under the 8-Factor Criteria

(1) The actual or relative potential for abuse.

Mitragynine is the primary psychoactive alkaloid found in the Mitragyna speciosa plant, commonly known as kratom. Mitragynine accounts for up to 66 percent of the alkaloid content in kratom.[i] Manufacturers of natural kratom products profess that minor alkaloids in natural kratom are undetectable.[ii] Kratom has a long history of traditional use in Southeast Asia with the use of its leaf or extracts typically ingested orally for the treatment of pain and to aid in the performance of agricultural labor.[iii] These effects have been attributed to mitragynine, which acts as a partial agonist at the human μ-opioid receptor.[iv] The effects of kratom in humans are dose-dependent, with small doses producing a 'cocaine-like' stimulation while larger amounts cause 'morphine-like' sedative-narcotic effects.[v]

Although mitragynine is the most abundant alkaloid in kratom and credited for its effects, the plant contains over 40 naturally occurring known alkaloids. One study examined the likely effects of 25 of those compounds. The study concluded that all the compounds share the most structural similarities with controlled opioid analgesics, such as morphine derivatives. Further analysis determined that 22 (including mitragynine) of the 25 compounds in kratom bind to μ-opioid receptors. The authors further noted:

> *The data from the PHASE model shows us that kratom compounds are predicted to affect the body just like opioids. Based on the scientific information in the literature and further supported by our computational modeling and the reports of its adverse effects in humans, we feel confident in calling compounds found in kratom, opioids.*[vi]

The FDA confirms that no marketer has sought to develop a drug that includes kratom in the US.[vii] Further, the World Health Organization verifies that kratom and its alkaloids have never been licensed for therapeutic use.[viii] Mitragynine has not been approved for medical use as a drug, nor is it generally recognized as safe by the FDA.[ix]

Kratom is illegal in 33 countries, including Malaysia where it is found naturally.[x] It is also banned in several states, including Alabama, Arkansas, Indiana, Vermont, Rhode Island, Louisiana, and Wisconsin.[xi] [xii] A new law in Connecticut, effective October 1, 2025, requires the state's Department of Consumer Protection (DCP) to designate kratom and 7-hydroxymitragynie as Schedule I controlled substances.[xiii] On December 10, 2025, Connecticut's DCP issued a notice of decision to move forward with the scheduling action.[xiv]

Appendix A

Kratom has also been identified as a Drug of Concern by the US Drug Enforcement Administration (DEA).[xv]

Despite its lack of approved use, kratom and its primary alkaloid, mitragynine, have been used to self-treat conditions such as chronic pain, fatigue, and psychiatric disorders (including substance use disorder and attention deficit hyperactivity disorder). For example, the Ohio Substance Abuse Monitoring Network reported about the availability of kratom in Ohio and its marketing towards individuals who are experiencing opioid use disorder. One respondent noted: "Advertisement for kratom [are] on Facebook…advertised as a way to get off of opiates, certain kinds of opiates; [Kratom] has similar withdrawal [symptoms as heroin]; Kratom mimics the effects of heroin…but the POs (parole officers) are aware of it now." A treatment provider also reported that people are using kratom for its purported health benefits such as the treatment of pain, noting, "you can go to the store and buy [kratom] now…because people look up positive things about it (health benefits). It's a pain reliever…it does give the effect of opiates or heroin…If someone has a little pain and they think it's healthy and natural [then they may try it]…."[xvi]

Still others begin using kratom for relaxation, euphoria, or to enhance performance.[xvii] The end result for many consumers of these products has been an inability to control their use—actual abuse. Below are comments submitted to the Ohio Board of Pharmacy by consumers of products whose manufacturers profess are natural, herbal, or kratom.

- *Good morning. I understand the Ohio Board of Pharmacy is considering a ban on Kratom. I am in support of this ban. I have a family member that has become addicted to Feel Free made by Botanic Tonics. It was originally marketed as a kava drink and alcohol alternative. Come to find out the company is facing many lawsuits due to its false marketing. While they now say it includes kratom, it's too late for my family. The drink is extremely addictive and very strong. I don't believe that it is pure leaf kratom, there has to be more in this drink. It has created many issues for my family and severely negatively impacted my family's life. Please consider this ban. This drink is legal opioid and available at most gas stations. This drink is very addictive and dangerous. Please seriously consider the ban on kratom and more specifically Feel Free. Also, please reference the Reddit thread quitting feelfree, you will see all the people suffering from the dangerous and addictive qualities of this drink.*[xviii]

Appendix A

- *Hello, I am a married wife of a kratom addict. I married my husband 7 years ago after he was clean off drugs (pills, cocaine, weed) for 8 years. He relapsed after 4 years into our marriage and has been addicted to kratom since. He was offered a sample by a gas station attendant … stated "are you looking for energy, try this". Since then he takes up to 60 capsules a day lost 25 pounds and is in a constant state of irritability, speedy, highs, and super lows withdrawling ect. He tried detox once and relapse 2 days later. He says it's so hard to quit bc it's so easy to get and cheap. This garbage is horrible and I cannot believe kids can get a hold of this junk. I am pleading for your office to understand the severity of this "supplement". My soon to be ex-husband has now transitioned to the "7oh tabs" that are more potent and also easy to get apparently sold at smoke shops and cbd stores. I know it is the choice of the individual to pick up a substance and it's their responsibility to quit, but I worry about my kids (16 and 5) in their future if they stumble upon this gas station heroine. To whatever it's worth I just wanted to share my story.*[xix]

- *My husband is a recovering opioid addict. Recently, he was introduced to kratom tablets and began taking them without telling me. When I first noticed the physical changes—his pupils shrinking and his energy levels spiking—I honestly believed he had relapsed on opioids. It was terrifying and brought back painful memories of our past struggles. He has now been taking kratom daily for months. He repeatedly tells me he plans to stop, but I can see that he cannot. He is worried about withdrawal and continues to use it despite the harm it is causing to his health and to our family. To me, this feels like we are back at square one, only with a substance that is currently unregulated and readily available. This is not the first time we have faced this danger. About a year ago, my husband was using the "blue bottle Feel Free" drinks (also containing kratom). After months of daily use, he ended up hospitalized with dangerously high liver enzyme levels and signs of serious liver damage. It took a long recovery, and now we are living through a repeat situation with kratom tablets. I know kratom is sometimes marketed as a "safe alternative" or a supplement, but my family's experience shows otherwise. For people in recovery, it is not a harmless plant—it is another addictive drug that threatens to undo years of hard work and healing.*[xx]

- *Someone very close to me began using kratom thinking it was a safe, natural way to manage stress and pain with out opiates. Over time, I watched it take over their life. They became anxious, detached, angry, and sick when they tried to stop. It broke my*

> *heart to see how something so easy to buy could cause such deep harm — not only to them, but to everyone who loves them. He would pass out while alone with our 22month old, he has been hospitalized with heart problems from use. We both have missed work, it has damaged our relationship, careers, children, and every aspect of our lives.*[xxi]

According to a recent news report, "many people who descended into kratom addiction say gas station products sucked them in. The 'Quitting Kratom' subreddit has 52,000 members and several posts a day from people documenting their journeys trying to quit kratom and 7-OH."[xxii] Medications approved by the FDA to treat opioid-use disorder have been used to treat individuals experiencing substance-use disorder associated with kratom. For example, a case report of a male in his 40s with a history of kratom use was successfully treated with buprenorphine/naloxone, which helped alleviate his withdrawal symptoms and allowed him to abstain from kratom.[xxiii] Other case examples have been cited throughout medical literature to support the use of buprenorphine/naloxone to treat kratom-use disorder.[xxiv] [xxv]

Another study conducted interviews with 395 kratom users and classified users into four distinct categories. Two classes included people using kratom for the self-treatment of chronic pain or substance use disorder and comprised approximately 52 percent of respondents. The other two classes, about 48 percent of respondents, reported using kratom to "get high." The study also notes that individuals who reported using kratom to "get high" and who had the highest probability of kratom-use disorder were more likely to characterize kratom as "habit-forming, addictive, problematic, and inconsistent in its effects."[xxvi]

(2) The scientific evidence of the pharmacological effect of the substance.

The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) notes that kratom and its related compounds are selective and full agonists of the μ-opioid receptor. The effects of kratom in humans are dose-dependent, with small doses producing a 'cocaine-like' stimulation while larger amounts cause 'morphine-like' sedative-narcotic effects.[xxvii]

A review published in 2024 notes that "mitragynine intake may be beneficial according to previous scientific data that presents its characteristics in antinociception, anti-inflammation, antidepressant, stimulant activity, sedative activity, anxiolytic activity, cognitive effects, and management of opioid withdrawal, which might be used as natural

remedies for various illnesses." However, the authors noted that uncontrolled use of mitragynine may promote tolerance development and produce withdrawal symptoms upon abstinence."[xxviii]

One study conducted of kratom users in Malaysia found high rates of severe kratom dependence among regular users. More than half of regular users (those using for more than 6 months) reported severe kratom dependence, while 45% showed moderate kratom dependence. Physical withdrawal symptoms commonly experienced include muscle spasms and pain, sleeping difficulty, watery eyes/nose, hot flashes, fever, decreased appetite, and diarrhea. Psychological withdrawal symptoms commonly reported were restlessness, tension, anger, sadness, and nervousness. The study authors also noted that regular users who consumed 3 or more glasses of kratom per day had "higher odds of developing severe Kratom dependence, withdrawal symptoms, and inability to control Kratom craving."[xxix]

Medications approved by the FDA to treat opioid-use disorder have been used to treat individuals experiencing kratom-use disorder. Case examples have been cited throughout medical literature to support the use of buprenorphine/naloxone to treat kratom-use disorder.[xxx] [xxxi] There are also examples of treating kratom withdrawal symptoms with medications such as clonidine and hydroxyzine that are often used off-label to manage opioid withdrawal.[xxxii] [xxxiii] [xxxiv]

A case report of a male in his 40s with a history of kratom use was successfully treated with buprenorphine/naloxone, which helped alleviate his withdrawal symptoms and allowed him to abstain from kratom:

> *The patient was introduced to kratom 12 years ago by his brother for relaxation, stress relief, and as a substitute for oxycodone. He gradually increased his dose up to 40g of powder per day from an initial 6g/daily. He purchased kratom online and at a local gas station, and his weekly expenditure on the substance ranged from $100 to $600. Over time, he spent less time with family and friends, engaged in fewer recreational activities, and spent more time using kratom to relax at home. He realized that he was dependent on the substance when he experienced withdrawal symptoms such as diarrhea and anxiety when he skipped or reduced his use of the substance. He attempted to self-treat his addiction by decreasing his dose but experienced severe withdrawal symptoms, including stress, headaches, diarrhea, nausea, and dizziness. His inability to quit kratom*

prompted him to seek medical help from his primary care physician. This was his first time seeking help from a physician. The patient was provided with the opportunity to connect with substance abuse clinics and other self-help groups, but he preferred pharmacological treatment.[xxxv]

(3) The state of current scientific knowledge regarding the substance.

Little clinical dosing research exists for kratom and its primary alkaloid, mitragynine. Neither kratom nor mitragynine have progressed past Phase 1 clinical trials.[xxxvi] [xxxvii] "Despite the increasing availability of human in vitro and in vivo animal data, rigorous fundamental information about the pharmacokinetics of kratom alkaloids in humans remains limited."[xxxviii]

Of the sparse pharmacokinetic research available, one study of twelve enrolled subjects monitored plasma levels of mitragynine and one of its metabolites, 7-hydroxymitragynine (7-OH), at various doses. The study found that 7-OH in plasma increased in a dose proportional manner after subjects consumed mitragynine contained in botanical kratom. The study also concluded that 7-OH steady state is reached after seven days of continuous dosing.[xxxix]

An increasing amount of 7-OH in plasma that is proportional with an individual's dose of mitragynine is important for two reasons. First, as discussed under Factor 4 below, mitragynine found in consumer products today is often several times more potent than traditional leaf products. Second, 7-OH is approximately 10 times more potent than mitragynine.[xl] At just 10 times the potency of mitragynine, the effects and actual abuse of 7-OH prompted Food and Drug Administration (FDA) Commissioner Dr. Martin Makary to warn that it could be the next wave of the opioid crisis.[xli]

Mitragynine has not undergone randomized, placebo-controlled studies necessary to demonstrate efficacy for any condition while minimizing the significant risks associated with it.[xlii] "FDA has warned consumers not to use kratom because of the risk of serious adverse events, including liver toxicity, seizures, and substance use disorder (SUD). In rare cases, deaths have been associated with kratom use, as confirmed by a medical examiner or toxicology reports."

Significantly, Phase I clinical studies explore the safety and tolerability of substances on 100 or fewer healthy adults.[xliv] Most drugs—nearly 70 percent—that undergo Phase 1 clinical trials succeed to Phase 2 clinical trials. It is not until Phase 2 that research on a substance's ability to treat a condition and its side effects are studied. This usually occurs with several hundred subjects who have the disease or condition in question. Approximately 33 percent of substances proceed to Phase 3 where efficacy is continued to be studied, and adverse effects are monitored on somewhere between several hundred to several thousand individuals with the disease or condition in question.[xlv]

(4) The history and current pattern of abuse.

Kratom has been used for centuries in Southeast Asia by laborers for its stimulant and analgesic effects.[xlvi] As previously discussed, kratom and its primary alkaloid, mitragynine, have been used to self-treat conditions such as chronic pain, fatigue, and psychiatric disorders (including substance use disorder and attention deficit hyperactivity disorder). Still others begin using kratom for relaxation, euphoria, or to enhance performance. [xlvii]

Despite a long history of use originating from Southeast Asia, the widespread commercialization of kratom and its primary alkaloid, mitragynine, is a recent development. Both products sold as vegetation and those labeled as ground vegetation have been found to contain several times the amount of mitragynine than actual kratom leaf material. [xlviii] Indeed, manufacturers of products marketed as "all-

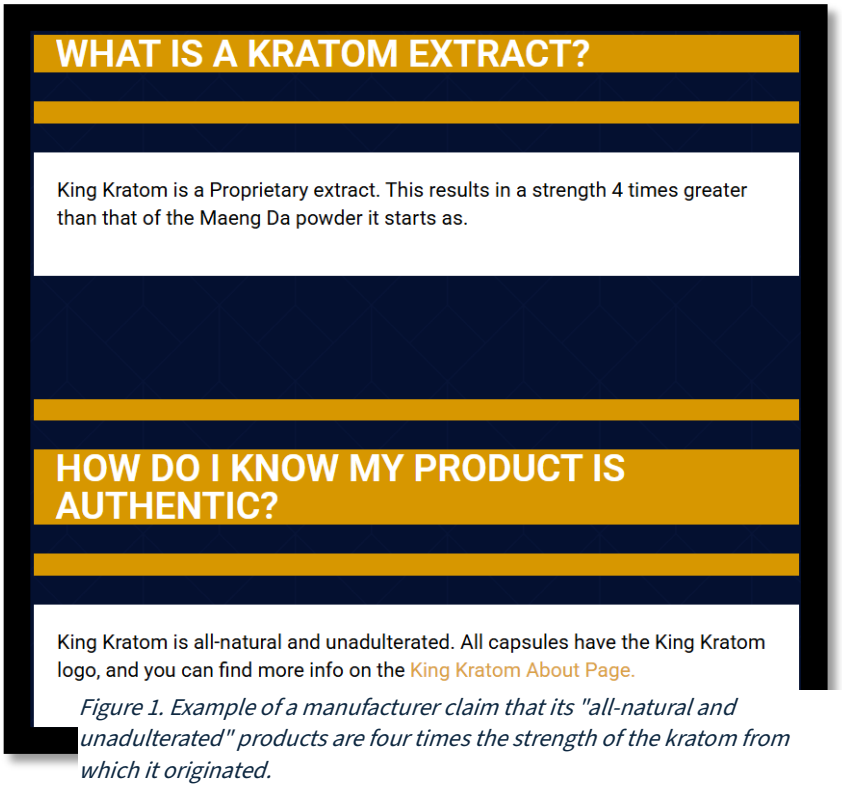


Figure 1. Example of a manufacturer claim that its "all-natural and unadulterated" products are four times the strength of the kratom from which it originated.

natural and unadulterated" acknowledge that extracts are several times greater than the plant from which they start (see Figure 1).[xlix] Postmortem toxicology findings from patients who used kratom had concentrations "higher than those reported in Thai individuals consuming traditional kratom tea without adverse effects."[l]

As kratom commercialization has grown, so too have the number of adverse events reported to poison control centers. From January 1 to July 31, 2025, poison control centers in the United States (US) received 1,690 reports of exposure cases involving kratom, a number that already surpasses the total for all of 2024.[li] Notably, adverse events associated with items that can be categorized as supplements are underreported. At least one source estimates the reporting rate for adverse events related to supplements to be approximately 2 percent.[lii] Reports of kratom exposure have been associated with opioid toxicities including seizures, agitation, and death.[liii]

The Ohio Substance Abuse Monitoring (OSAM) Network report from January 2025 found kratom use associated with opioid use, as the substance reportedly has similar effects, and kratom is reportedly advertised to help mitigate opioid withdrawal symptoms and stop opioid use. While its notoriety appears to be causing drug screening to expand, there is evidence that some individuals consumed kratom because it would not appear on drug screens. One testimonial provided, *"[a]dvertisements for kratom* [are] *on Facebook … advertised as a way to get off of opiates, certain kinds of opiates;* [Kratom] *has similar withdrawal* [symptoms as heroin]*; Kratom mimics the effects of heroin … but the POs (parole officers) are aware of it now."*[liv]

Access to mitragynine can be further abused when it is isolated from kratom leaves. It can then be synthetically transformed into 7-OH and other semi-synthetic opioids—some with significantly enhanced μ-opioid receptor activity. One such compound, MGM-15 (dihydro-7-hydroxy mitragynine), first described in 2014, is a highly potent semi-synthetic opioid that can be synthesized from 7-hydroxymitragynine in a single step. In September 2025, the presence of MGM-15 was confirmed in commercially available tablets.[lv] These compounds were legally available in Ohio until rule 4729:9-1-01.1 of the Ohio Administrative Code became effective on December 12, 2025.[lvi]

(5) The scope, duration, and significance of abuse.

Although there is apparent consensus that the number of Americans who use kratom is in the millions, the precise number of those who use it is more nebulous. The Substance Abuse and Mental Health Services Administration estimated that in 2021, 1.7 million Americans aged 12 and older used kratom.[lvii] More recently, Harvard Medical School estimated that between 2 and 15 million Americans may be using kratom.[lviii]

The Ohio Substance Abuse Monitoring (OSAM) Network report from January 2025 found kratom use associated with opioid use, as the substance reportedly has similar effects, and kratom is reportedly advertised to help mitigate opioid withdrawal symptoms and stop opioid use. They stated: *"[a]dvertisements for kratom* [are] *on Facebook … advertised as a way to get off of opiates, certain kinds of opiates;* [Kratom] *has similar withdrawal* [symptoms as heroin]*; Kratom mimics the effects of heroin … but the POs (parole officers) are aware of it now."*[lix]

One research group prioritized its study in part because, "[t]eas and powders made from the kratom . . . plant are gaining in popularity due to their opioid-like effects."[lx] A treatment provider in the Cleveland region spoke about the promoted health benefits of kratom, saying, *"[y]ou can go to the store and buy* [kratom] *now … because people look up positive things about it (health benefits). It's a pain reliever … it does give the effect of opiates or heroin…. If someone has a little pain and they think it's healthy and natural* [then they may try it]*…"*[lxi]

Reportedly, kratom is desirable to some because it is not always included on drug screens. Treatment providers observed, *"Kratom is still one of those things that's out there that's being abused, that's not being caught* [through drug screening]*; I spoke to our nurse practitioner, and in small doses* [kratom] *doesn't show up on the* [drug] *screen. It's because people are taking way high doses that are detectable* [on drug screens] *that are not good for you, you know, addiction wise; A lot of places don't test for it* [on drug screens]*. So, until we started testing for it, I didn't hear that much about it, but now our lab tests routinely include kratom."*[lxii]

Public comments serve as further evidence of the significance of kratom abuse in Ohio. As discussed in the analysis of Factor 1, the Board of Pharmacy received comments from several individuals regarding the impact of kratom use. Reported impacts include relapses by those

in recovery, significant weight loss, inability to cease use despite adverse impacts on personal relationships and finances, liver damage, and heart issues.

Finally, a reality of modern drug misuse is that an increasing number of individuals engage in polydrug use with little to no knowledge of contraindications. This is true of both illicit drugs and prescription medication. From 2019 to 2023, the amount of unintentional drug overdose deaths in Ohio that involved multiple drugs ranged from 58 to 69 percent.[lxiii] Given this context, it would be irresponsible to discount the risk of polydrug use.

Kratom is no different. "In parallel with the increase in popularity of kratom is an increase in kratom-associated overdose deaths when concomitantly used with other drugs."[lxiv] The impact of consuming kratom with other substances is described in two Reddit posts from those impacted by kratom misuse found in Appendix A. These posts warn that kratom consumption with common medications can cause heart issues and even death.

(6) The risk to the public health.

"FDA has warned consumers not to use kratom because of the risk of serious adverse events, including liver toxicity, seizures, and substance use disorder (SUD). In rare cases, deaths have been associated with kratom use, as confirmed by a medical examiner or toxicology reports."[lxv]

In Ohio, a growing number of deaths associated with kratom have been reported, indicating that it is a risk to public health. From 2019 to 2024, the Ohio Department of Health reported at least 202 deaths in which kratom is listed as a cause of death (see Table 1).

Appendix A

Table 1. Number of Unintentional Drug Overdose Deaths Involving Kratom (Mitragynine), 2019 - 2024[lxvi]							
Year	Total No. of Overdose Deaths	No. of Deaths with Kratom Detected in Postmortem Toxicology	% of Total Overdose Deaths with Kratom Detected in Postmortem Toxicology	No. of Deaths with Kratom Listed as a Cause of Death	% of Deaths with Kratom Detected in Postmortem Toxicology where Kratom Was Listed as a Cause of Death	No. of Deaths with Kratom Detected in Postmortem Toxicology That Were Also Positive for Other Substances	% of Deaths with Kratom Detected in Postmortem Toxicology That Were Also Positive for Other Substances
2019	3,962	19	0.5%	15	78.9%	17	89.5%
2020	4,943	34	0.7%	29	85.3%	29	85.3%
2021	5,174	49	0.9%	37	75.5%	41	83.7%
2022	4,916	47	1.0%	40	85.1%	44	93.6%
2023	4,461	52	1.2%	37	71.2%	43	82.7%
2024*	3,015	54	1.8%	44	81.5%	43	79.6%
Total	**26,471**	**255**	**0.9%**	**202**	**79.2%**	**217**	**85.1%**

**Data for 2024 is not yet complete.*

Several forensic cases of opioid-like deaths with lung congestion and high postmortem mitragynine blood concentrations with no obvious alternative causes of death have now been reported.[lxvii] [lxviii] There is also a report of naloxone being successfully used to reverse kratom intoxication.[lxix] This evidence suggests that high enough doses of kratom alkaloids may cause opioid toxicity via the usual opioid-receptor pathways implicated in conventional opioid overdoses.[lxx]

In 2019, Utah developed a regulatory scheme that allowed continued access to kratom over-the-counter. Despite age restrictions and limited alkaloid access, overdose deaths related to kratom and treatment for kratom use disorder persisted. One emergency room physician reported patients sharing that they "had no idea it was just like a narcotic," and that his patients experience the same withdrawal symptoms as those withdrawing from narcotics.[lxxi] The Utah State Medical Examiner reported nearly 160 kratom-related deaths over a five-year period. While most of those overdoses involved polysubstance use, the state saw almost 50% as many kratom-only deaths in the most recent 12-month reporting period as Utah had seen since 2014.[lxxii] Consequently, the Utah legislature proposed to add all alkaloids from kratom and their analogs to the state's list of controlled substances in November 2025. The bill sponsor originally voted to regulate kratom in 2019 but now "sees kratom in all forms as a dangerous opioid masquerading as a supplement."[lxxiii]

There are also documented cases of kratom use by expecting mothers resulting in neonatal abstinence syndrome for newborns.[lxxiv] [lxxv] [lxxvi] [lxxvii] These cases are particularly concerning given that the promotion of kratom products as safe alternatives to opioids may well persuade expecting mothers to consume kratom products to avoid the adverse impacts of opioids on their unborn child. The concern is compounded by the tendency of consumers to believe that the legal status of a substance means that it is a safe alternative to a controlled substance.[lxxviii]

At least one manufacturer reinforces this notion with misleading statements like, "[f]eel better with the only kratom products studied in clinical trials," and "US Made in our FDA-registered space in Florida" (see Figure 2).[lxxix] The FDA is unequivocal in its warning against kratom use due to its adverse effects.[lxxx] "There are no FDA-approved drugs containing kratom."[lxxxi] According to the FDA, kratom and mitragynine are also unlawful "when added to conventional foods, as dietary supplements, [and] as ingredients in any FDA-approved drug."[lxxxii]

Figure 2. Claims made by a manufacturer of self-proclaimed "pure, unadulterated" kratom.

Evidence supports the position that the ingredients in kratom available to consumers are void of robust quality control. In 2019, FDA conducted laboratory testing on 30 different kratom products from a variety of sources. The analysis found "significant levels of lead and nickel at concentrations that exceed safe exposure for oral daily drug intake."[lxxxiii] A third-party analysis of kratom products also found samples that exceeded daily exposure limits for lead. The authors noted that "non-extract products (powders, capsules, tablets) generally contain greater concentrations of elemental impurities than extract products or the soda preparation."[lxxxiv]

Appendix A

In 2018, the CDC investigated a multistate outbreak of *Salmonella* infections linked to kratom. The agency reported that a total of 199 people were infected with outbreak strains of *Salmonella* across 41 states, including 7 individuals in Ohio. Of those 199, thirty-eight percent of those individuals were hospitalized. CDC investigators stated that "epidemiologic and laboratory evidence indicated that kratom was the likely source of this multistate outbreak."[lxxxv]

The presence of lead and other heavy metals may increase the risk of adverse health outcomes for regular kratom users.[lxxxvi] For example, a case report from Iowa found a patient with suspected Fanconi syndrome from cadmium toxicity due to heavy kratom use. The report found high levels of cadmium in both the patient's blood stream and kratom the patient consumed.[lxxxvii]

According to the World Health Organization, chronic kratom use has been associated with at least 92 cases of liver toxicity. They note that common presenting signs and symptoms include abdominal discomfort, jaundice, pruritus, and dark-colored urine. These typically start about 3 weeks after initiation of kratom use and resolve within one month of stopping kratom use.[lxxxviii]

Additionally, there are no age verification requirements to prevent the sale of kratom products to children. This raises serious concerns about the impact of these compounds on the developing brain. The 2021 National Survey on Drug Use estimates that at least 45,000 adolescents in the US (ages 12-17) used kratom in the past year. This presents public health risks to adolescents given studies showing "adolescent kratom exposure particularly mitragynine and LKD [lyophilised kratom decoction] may cause selective cognitive and behavioural deficits. The brain metabolite profiles further suggest that the altered metabolic pathway (i.e., arachidonic acid, pantothenate and CoA, and tryptophan) may underlie the kratom-induced cognitive and behavioural deficits. Together, these findings demonstrate that adolescents' brain is sensitive to the impact of early kratom exposure during this critical development period."[lxxxix]

(7) The potential of the substance to produce psychic or physiological dependence liability.

Cases of dependence to kratom have been documented for the last several decades.[xc] Mitragynine has agonist activity at μ-opioid receptors and may lead to dependence and addiction.[xci] Further, the European Union Drug Agency, FDA, DEA, Mayo Clinic, and others agree that individuals can develop a dependence to kratom.[xcii] According to the FDA, "[c]ases of kratom-related SUD have also been observed. In these cases, individuals met certain criteria for SUD, including using kratom for longer than intended, using more kratom than intended, having cravings for kratom, continuing to use kratom despite adverse consequences (either physically or in their personal life), increasing the amount of kratom used to produce the same effect (tolerance), and experiencing withdrawal symptoms when kratom use was stopped (physical dependence)."[xciii]

In-person interviews with convenience samples of long-term daily oral kratom users in Southeast Asia find up to three-quarters reporting withdrawal symptoms after cessation of use. Typical withdrawal symptoms include irritability, anxiety, depression, sleep disturbance, lacrimation, rhinorrhea, muscle and bone pain, muscle spasm, diarrhea, and decreased appetite. The likelihood and severity of withdrawal are positively associated with duration, frequency, and intensity of kratom use.[xciv]

Recent news reports also highlight the psychic or physiological dependence of kratom. For example, an Akron woman reported developing "a debilitating kratom addiction" after consuming a product containing the substance thinking it was a safe, "plant-based" drink. She ended up losing her house, marriage, and half of her body weight because of her exposure and subsequent addiction to this compound. The woman reports "her addiction would have taken her life too, had she not gone to rehab in 2024."[xcv]

Another news report demonstrates the danger of having these products readily accessible. An individual using a popular kratom-based drink available at local gas stations reported spending about $2,000 per month (consuming about 10 to 12 bottles per day). According to the report, he "…soon found that after the immediate euphoria from the shot, he would be hit with a cycle of unpleasant symptoms, including a runny nose and achy body." The individual closed down their business and had to seek in-patient treatment.[xcvi]

Finally, it is not unusual for kratom manufacturers themselves to acknowledge the risk of developing a dependence to kratom. One such acknowledgement provides, "[s]ensing the need to up your serving size or not feeling the expected results? A tolerance break might do the trick. Take 2–3 days off from kratom, then restart at a lower serving size" (see Figure 3).[xcvii]

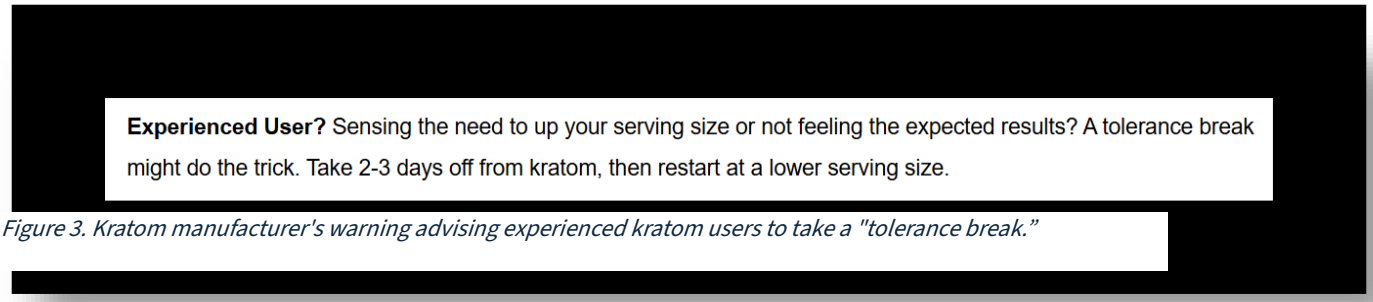


Figure 3. Kratom manufacturer's warning advising experienced kratom users to take a "tolerance break."

Despite warnings that kratom may be habit forming and should not be consumed every day, testimonials posted by kratom manufacturers encourage daily use for relief of discomfort, stating, "this is my favorite kind of kratom. . . It is the best for relieving daily discomfort in your mind or your body."[xcviii] Additional examples from a variety of manufacturers warning of the risk of addiction can be found in Appendix B.

(8) Whether the substance is an immediate precursor.

Mitragynine is a known precursor to mitragynine-related compounds, which are schedule I controlled substances in Ohio. According to the European Union Drug Agency, "[t]he chemical total syntheses reported for several kratom alkaloids are too complex to be used for economic production of any [of] these compounds. However, mitragynine can serve as a chemical precursor to the more potent 7-hydroxymitragynine."[xcix]

Mitragynine is highly likely to follow the same pattern seen with other drug classes like bath salts. Bath salts were created by modifying cathinones, a primary active ingredient found in a plant called khat.[c] As soon as one of those modifications was identified and scheduled, a new cathinone-like compound was developed to evade the law.

Looking to past illicit drug patterns, unexpected ways to synthesize mitragynine-related compounds will be established. At least one pathway would use mitragynine to make 7-OH and then MGM-15, the previously discussed potent opioid already identified in commercially

available tablets.[ci] Should unfettered access to mitragynine remain, we can anticipate the creation of additional potent novel compounds that are marketed to the general public, including children.

Section 4: Finding of the Board

Pursuant to section 3719.44 of the Ohio Revised Code, the Board may add or transfer a compound, mixture, preparation, or substance to Schedule I when it appears that there is a high potential for abuse, that it has no accepted medical use in treatment in this state, or that it lacks accepted safety for use in treatment under medical supervision.

After a review of all available data, the Board finds mitragynine has a high potential for abuse, has no accepted medical use in treatment in this state, and that it lacks accepted safety for use in treatment under medical supervision.

Section 5: Resolution of the Board

Based on these findings, the Board hereby authorizes the filing of rule 4729:9-1-01.2 of the Administrative Code with the Common Sense Initiative and the Joint Committee on Agency Rule Review to classify as a schedule I opiate or opiate derivative any material, compound, mixture, or preparation that contains mitragynine.

Section 6: Proposed Rule

4729:9-1-01.2 – Mitragynine (NEW)

Notwithstanding any other provision of the Administrative Code, the following is classified as a schedule I controlled substance opiate or opiate derivative:

(A) Mitragynine ((αE,2S,3S,12bS)-3-ethyl-1,2,3,4,6,7,12,12b-octahydro-8-methoxy-α-(methoxymethylene)-indolo[2,3-a]quinolizine-2-acetic acid, methyl ester) and / or synthetic substances, derivatives, prodrugs, isomers, esters, ethers, salts, and salts of isomers with similar chemical structure.

Appendix A - Reddit Comments

Kratom had a toxic effect with the antidepressant and antipsychotic meds and killed my daughter

My 24 yo daughter died from mixing her regular prescribed psych meds with kratom. Her full autopsy listed the cause as poly drug toxicity and her prescribed meds were all in therapeutic levels.

The toxicology and full autopsy report confirmed what was in her system:

- Aripiprazole (antipsychotic)
- Lamotrigine (mood stabilizer)
- Venlafaxine (antidepressant)
- Mitragynine (the active compound in kratom)

There was no warning on the kratom for interactions with other meds or the dangers. This stuff is sold in smoke shops and gas stations, over the counter and marketed as "natural" and "safe".

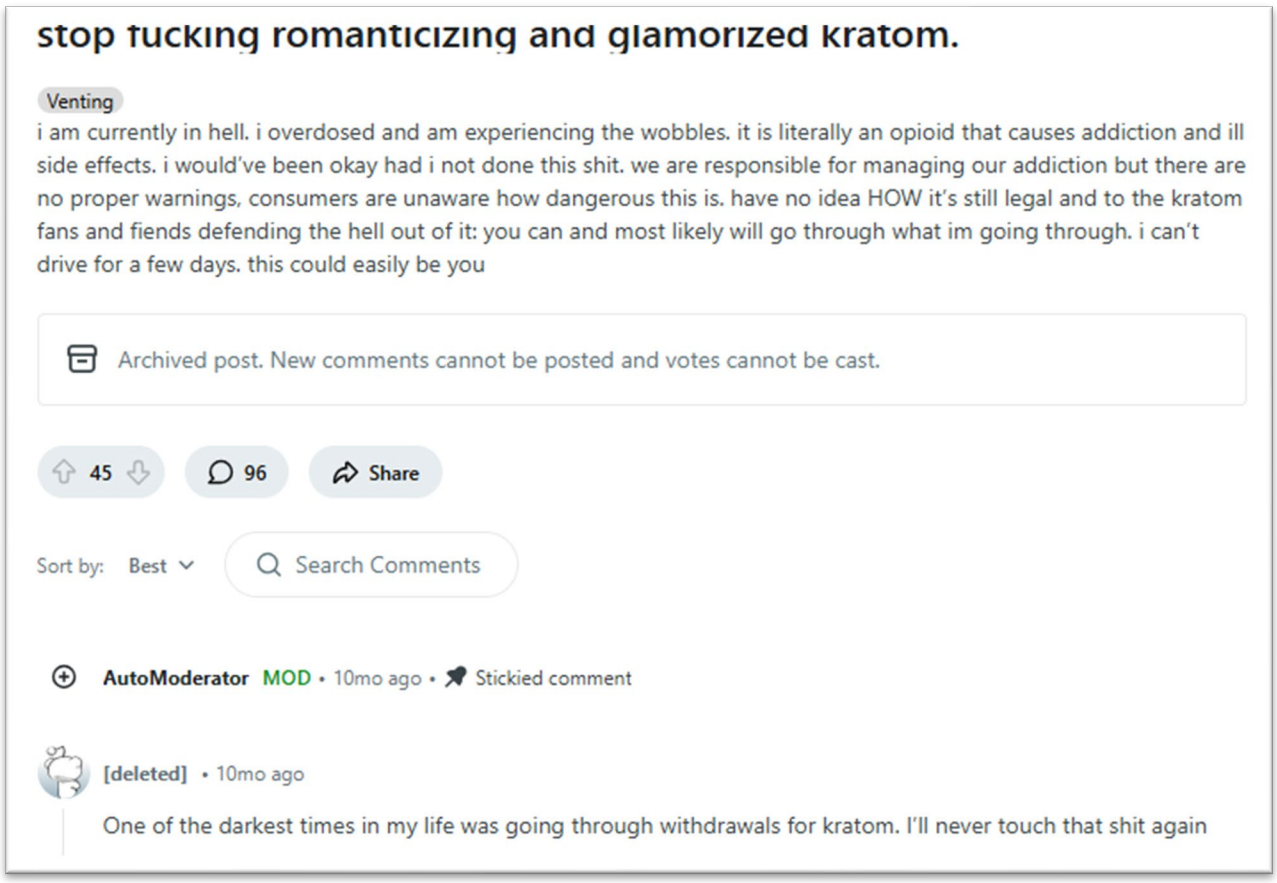
I was with her when she died. She was scared. She said she didn't want to die. She felt that something was wrong and her chest hurt. Her heart was beating so fast, then she had cardiac arrest and died right in front of me. CPR could not bring her back. The EMTs gave her narcan, it didn't help.

I've since learned that Kratom AMPLIFIES the toxicity of certain meds (psych meds specifically) and overwhelms the nervous system.

My daughter took what was prescribed to her, and she bought and took something she thought was safe, a supplement.

Kratom is NOT SAFE if you are taking other medications. Please share this information. I know she is not the only one this has happened to and if only there were warnings, it could have saved her life

Appendix A



stop fucking romanticizing and glamorized kratom.

Venting

i am currently in hell. i overdosed and am experiencing the wobbles. it is literally an opioid that causes addiction and ill side effects. i would've been okay had i not done this shit. we are responsible for managing our addiction but there are no proper warnings, consumers are unaware how dangerous this is. have no idea HOW it's still legal and to the kratom fans and fiends defending the hell out of it: you can and most likely will go through what im going through. i can't drive for a few days. this could easily be you

Archived post. New comments cannot be posted and votes cannot be cast.

45 96 Share

Sort by: Best Search Comments

AutoModerator MOD • 10mo ago • Stickied comment

[deleted] • 10mo ago

One of the darkest times in my life was going through withdrawals for kratom. I'll never touch that shit again

Appendix A

KRATOM WARNING: Do not mix with these medications (heart problems)

Let me preface this by saying I've mixed kratom with tramadol myself and had no problems, but that doesn't mean it's safe. Always air on the side of caution.

I recently found out that kratom is something called a QTc interval prolonger. QTc intervals are an EKG reading. If you mix QTc proloingers, it can potentially cause a heart arrhythmia reaction called torsades de pointes arrythmia. Many common medications and drugs including psych meds and tramadol are QTc interval prolongers.

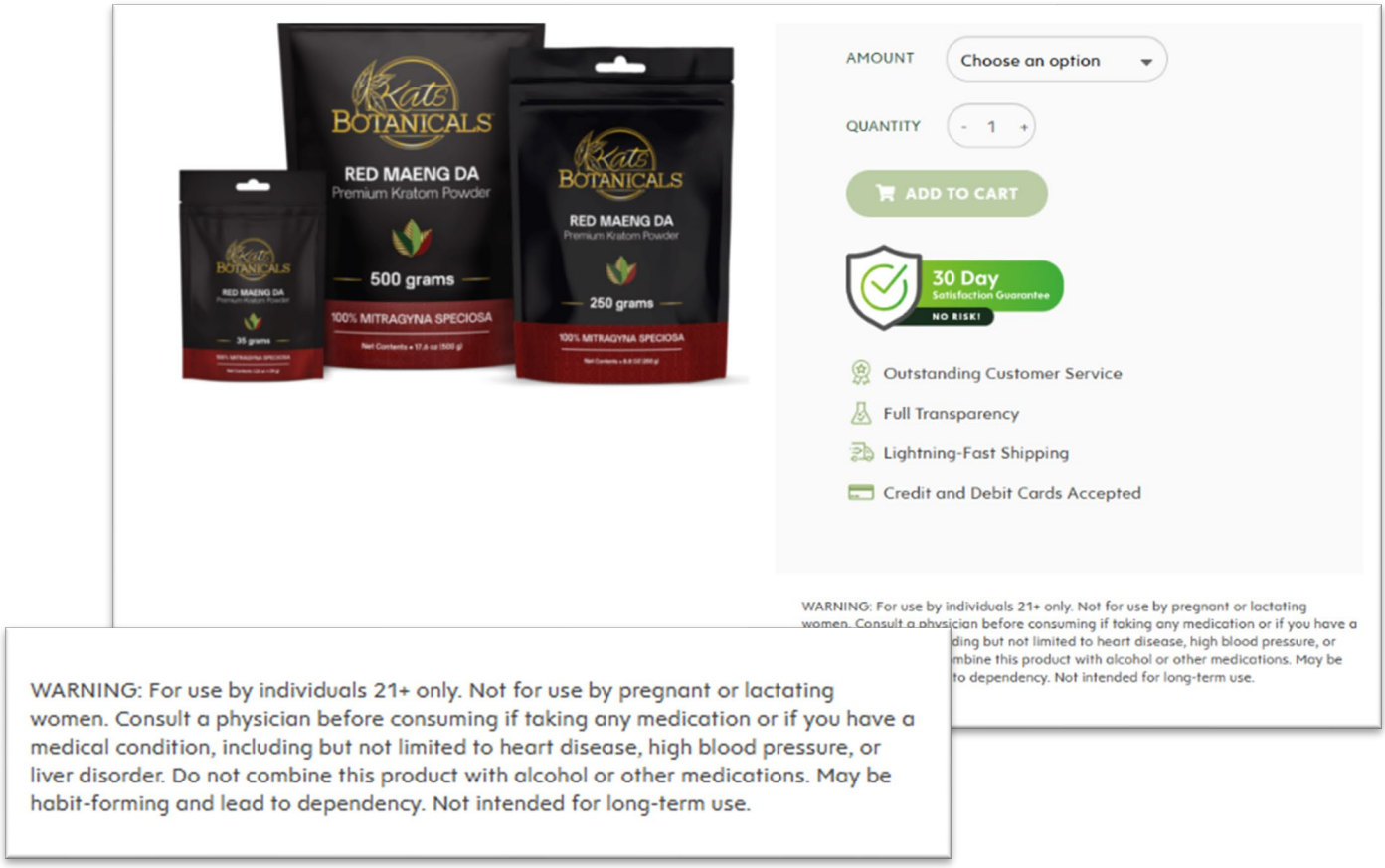
I never heard any warnings about mixing kratom with these medications. This information is important and very very unknown.

If you want to know what medications can cause a torsades de pointes arrythmia, this is a good place to start (although they require registration which is free) https://crediblemeds.org/index.php/login/dlcheck

Click all the AVAILABLE TDP RISK CATEGORIES, set show entries to all,and sort by name or category. There are also usually pubmed articles if you look for them, that will tell you whether a medication is or isn't one.

here is my source for kratom causing this reaction https://www.ncbi.nlm.nih.gov/pubmed/25535742

Appendix B – Product Labels & Examples



Source: ***https://katsbotanicals.com/product/red-maeng-da-kratom-powder*** ***(Last Accessed Jan 3, 2026)***

Appendix A

Source: ***https://amazingbotanicals.net/product/platinum-kratom-extract-tablets-80-ultra-purified-alkaloids/?srsltid=AfmBOopW-Igl9MBHQuhAoFJ_bvVLkeKiIgZoygOXYMvQH8N02PF3ZbAZ (Last Accessed Jan 3, 2026)***

Appendix A

ADULTS 21+ ONLY

KEEP OUT OF REACH OF CHILDREN

Supplement Facts

Serving Size: 1 fl oz (29.6 mL)
Servings Per Container: 2

	Amount Per Serving	%DV
Iron	0.4 mg	4%*
Kava root (extract)		
Total Kavalactones	260 mg	†
Leaf kratom (ground)		
Total Alkaloids	34 mg	†
Mitragynine	20 mg	†
7-hydroxymitragynine	<0.05 mg	†

* Percent Daily Value (DV) based on a 2,000 calorie diet.
† Daily Value (DV) not established.

Other ingredients: water, pineapple juice, natural flavors, stevia leaf, citric acid.

8 60003 64960 2

REV #007

DIRECTIONS: ONLY TAKE 1 OZ (1/2 BOTTLE) BY MOUTH AT A TIME. DO NOT EXCEED 2 OZ (1 BOTTLE) IN A 24-HOUR PERIOD. SHAKE WELL. REFRIGERATE AFTER OPENING.

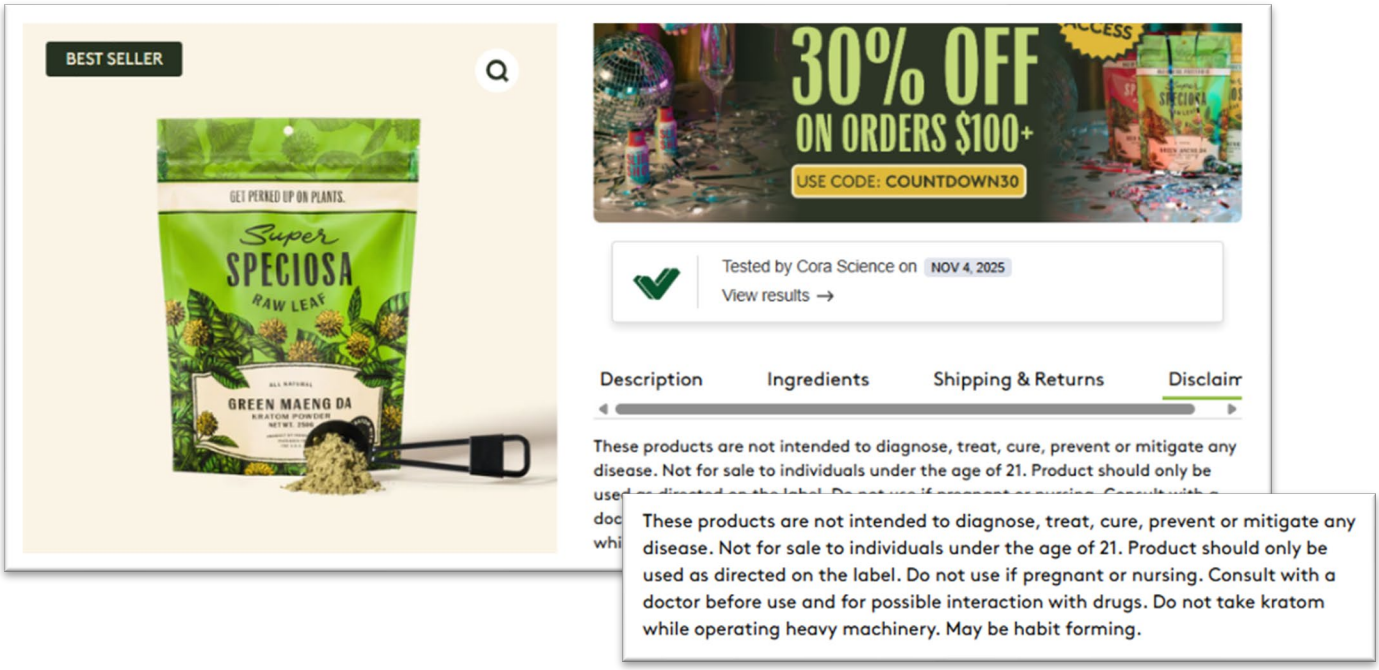
Warning: This product contains leaf kratom which, like caffeine and alcohol, may be habit-forming and harmful if consumed irresponsibly. Avoid if you have a history of substance abuse. When consumed as recommended, *feel free* CLASSIC has not been shown to cause any serious physical or social harm. **Caution:** Not for consumption by or sale to persons under the age of 21. May interact with certain medications—consult a licensed, qualified healthcare professional before use. Do not consume with excessive alcohol. **This product is not intended for those who are sensitive to the active ingredients or women who are pregnant, nursing, or trying to become pregnant.**

These statements have not been evaluated by the FDA. This product is not intended to diagnose, treat, cure or prevent any disease or illness.

BOTANIC TONICS, LLC
13105 E. 61ST STREET, SUITE B • BROKEN ARROW, OK 74012

Source: *https://botanictonics.com/products/feel-free-classic-tonic* ***(Last Accessed Jan 3, 2026)***

Appendix A



Source: https://superspeciosa.com/products/green-maeng-da-kratom-powder?_ab=0&_fd=0&_sc=1&selling_plan=5215191261 ***(Last Accessed Jan 3, 2026)***

Appendix A

References

[i] Tanna RS, Nguyen JT, Hadi DL, Manwill PK, Flores-Bocanegra L, Layton ME, White JR, Cech NB, Oberlies NH, Rettie AE, Thummel KE, Paine MF. Clinical Pharmacokinetic Assessment of Kratom (*Mitragyna speciosa*), a Botanical Product with Opioid-like Effects, in Healthy Adult Participants. Pharmaceutics. 2022 Mar 11;14(3):620. doi: 10.3390/pharmaceutics14030620. PMID: 35335999; PMCID: PMC8950611.

[ii] 1836 Kratom. 1836 Series: Intro & Our Perspective on 7OH. https://www.1836kratom.com/cinema. Accessed Dec. 24, 2025.

[iii] Garcia-Romeu A, Cox DJ, Smith KE, Dunn KE, Griffiths RR. Kratom (Mitragyna speciosa): User demographics, use patterns, and implications for the opioid epidemic. Drug Alcohol Depend. 2020 Mar 1;208:107849. doi: 10.1016/j.drugalcdep.2020.107849. Epub 2020 Feb 3. PMID: 32029298; PMCID: PMC7423016.

[iv] Hadi, D.L.; Manwill, P.K.; Flores-Bocanegra, L.; Layton, M.E.; White, J.R.; Cech, N.B.; Oberlies, N.H.; Rettie, A.E.; et al. Clinical Pharmacokinetic Assessment of Kratom (Mitragyna speciosa), a Botanical Product with Opioid-like Effects, in Healthy Adult Participants. Pharmaceutics 2022, 14, 620. https://doi.org/10.3390/pharmaceutics14030620.

[v] The European Monitoring Centre for Drugs and Drug Addiction. Kratom (Mitragyna speciosa) drug profile. http://www.emcdda.europa.eu/publications/drug-profiles/kratom#pharmacology

[vi] Ellis CR, Racz R, Kruhlak NL, Kim MT, Zakharov AV, Southall N, et al. (2020) Evaluating kratom alkaloids using PHASE. PLoS ONE 15(3):e0229646. https://doi.org/10.1371/journal.pone.0229646

[vii] US Food and Drug Administration. FDA and Kratom. https://www.fda.gov/news-events/public-health-focus/fda-and-kratom.

[viii] World Health Organization. Pre-Review Report: Kratom (Mitragyna speciosa), mitragynine, and 7-hydroxymitragynine. Expert Committee on Drug Dependence Forty-fourth Meeting Geneva, 11-15 October 2021. http://cdn.who.int/media/docs/default-source/controlled-substances/unedited--advance-copy-44th-ecdd-review-report_kratom.pdf?sfvrsn=8d699207_8&download=true

[ix] US Food and Drug Administration. 7-Hydroxymitragynine (7-OH): An Assessment of the Scientific Data and Toxicological Concerns Around an Emerging Opioid Threat. https://www.fda.gov/files/drugs/published/7-hydroxymitragynin_7-oh_an_assessment_of_the_scientific_data_and_toxicological_concerns_around_an_emerging_opioid_threat.pdf

[x] Kratom Legality by Country 2025. https://worldpopulationreview.com/country-rankings/kratom-legality-by-country

[xi] What's Kratom, and Why Are States Banning It? Governing Magazine. http://www.governing.com/topics/health-human-services/sl-kratom-state-ban.html; But see, https://rhodeislandcurrent.com/2025/05/29/kratom-regulation-bill-clears-rhode-island-house/

[xii] Act No. 41. 2025 Regular Session. www.legis.la.gov/legis/ViewDocument.aspx?d=1422223.

[xiii] Information About Kratom. October 07, 2025. https://portal.ct.gov/dcp/knowledge-base/articles/drug-control/patients/kratom-update-october-2025?language=en_US

[xiv] Notice of Decision. Department of Consumer Protection. Dec. 10, 2025. https://eregulations.ct.gov/eRegsPortal/Search/getDocument?guid={A0F9099B-0000-C5DC-9BE4-02B01812385D}

[xv] US Drug Enforcement Administration. Kratom. https://www.dea.gov/factsheets/kratom. Accessed Dec. 18, 2025.

[xvi] Ohio Department of Behavioral Health (2025). Ohio Substance Abuse Monitoring Network: Surveillance of Drug Use Trends in the State of Ohio: July – December 2024. Columbus, OH: State of Ohio.

[xvii] Hill K, Rogers JM, Grundmann O, Epstein DH, Smith KE. At least four groups of kratom consumers in the United States: latent-class analysis of motivations for kratom use. Am J Drug Alcohol Abuse. 2025 Mar 4;51(2):191-203. doi: 10.1080/00952990.2024.2414319. Epub 2025 Jan 30. PMID: 39883932.

[xviii] Received by contact@pharmacy.ohio.gov, September 9, 2025.

[xix] Received by contact@pharmacy.ohio.gov, August 28, 2025.

[xx] Received by contact@pharmacy.ohio.gov, September 9, 2025.

[xxi] Received by contact@pharmacy.ohio.gov, October 9, 2025.

[xxii] An Ohio woman thought kratom was just another energy drink. It ruined her life, sent her to rehab. https://www.beaconjournal.com/story/news/2025/08/06/ohio-kratom-7oh-addiction-

fda/85541942007/?taid=68937889698d6b0001e70a0e&utm_campaign=trueanthem&utm_medium=social&utm_source=twitter. Accessed Dec. 24, 2025.

[xxiii] Arhin M, Mobley J, Hamad H, Remick P. Successful Management of Kratom Use Disorder With Buprenorphine and Naloxone. Cureus. 2023 Jun 29;15(6):e41146. doi: 10.7759/cureus.41146. PMID: 37519540; PMCID: PMC10386870.

[xxiv] Sivakumar D, Pascual J, Kennedy M, Clark KT, Mason JM, Walfield AL, Hayes BD, Maldonado G. The successful use of buprenorphine to manage kratom withdrawal secondary to self-treatment of opioid withdrawal. Clin Toxicol (Phila). 2025 Nov;63(11):1018-1019. doi: 10.1080/15563650.2025.2552436. Epub 2025 Oct 30. PMID: 41166111.

[xxv] Buresh M. Treatment of Kratom Dependence With Buprenorphine-Naloxone Maintenance. J Addict Med. 2018 Nov/Dec;12(6):481-483. doi: 10.1097/ADM.0000000000000428. PMID: 29944481.

[xxvi] Hill K, Rogers JM, Grundmann O, Epstein DH, Smith KE. At least four groups of kratom consumers in the United States: latent-class analysis of motivations for kratom use. Am J Drug Alcohol Abuse. 2025 Mar 4;51(2):191-203. doi: 10.1080/00952990.2024.2414319. Epub 2025 Jan 30. PMID: 39883932.

[xxvii] The European Monitoring Centre for Drugs and Drug Addiction. Kratom (Mitragyna speciosa) drug profile. http://www.emcdda.europa.eu/publications/drug-profiles/kratom#pharmacology

[xxviii] Nur Aisyah Khairul Annuar, Ummi Kalthum Azlan, Ahmed Mediani, Xiaohui Tong, Rongchun Han, Ebtesam Al-Olayan, Syarul Nataqain Baharum, Hamidun Bunawan, Murni Nazira Sarian, Hamizah Shahirah Hamezah, Ibrahim Jantan, An insight review on the neuropharmacological effects, mechanisms of action, pharmacokinetics and toxicity of mitragynine, Biomedicine & Pharmacotherapy, Volume 171, 2024, 116134, ISSN 0753-3322, https://doi.org/10.1016/j.biopha.2024.116134. (https://www.sciencedirect.com/science/article/pii/S0753332224000155)

[xxix] Singh D, Müller CP, Vicknasingam BK. Kratom (Mitragyna speciosa) dependence, withdrawal symptoms and craving in regular users. Drug Alcohol Depend. 2014 Jun 1;139:132-7. doi: 10.1016/j.drugalcdep.2014.03.017. Epub 2014 Mar 22. PMID: 24698080.

[xxx] Sivakumar D, Pascual J, Kennedy M, Clark KT, Mason JM, Walfield AL, Hayes BD, Maldonado G. The successful use of buprenorphine to manage kratom withdrawal secondary to self-treatment of opioid withdrawal. Clin Toxicol (Phila). 2025 Nov;63(11):1018-1019. doi: 10.1080/15563650.2025.2552436. Epub 2025 Oct 30. PMID: 41166111.

[xxxi] Buresh M. Treatment of Kratom Dependence With Buprenorphine-Naloxone Maintenance. J Addict Med. 2018 Nov/Dec;12(6):481-483. doi: 10.1097/ADM.0000000000000428. PMID: 29944481.

[xxxii] Clinical Guidelines for Withdrawal Management and Treatment of Drug Dependence in Closed Settings. Geneva: World Health Organization; 2009. 4, Withdrawal Management. Available from: https://www.ncbi.nlm.nih.gov/books/NBK310652/

[xxxiii] Erlendson MJ, D'Arcy N, Encisco EM, Yu JJ, Rincon-Cruz L, Peltz G, Clark JD, Chu LF. Palonosetron and hydroxyzine pre-treatment reduces the objective signs of experimentally-induced acute opioid withdrawal in humans: a double-blinded, randomized, placebo-controlled crossover study. Am J Drug Alcohol Abuse. 2017 Jan;43(1):78-86. doi: 10.1080/00952990.2016.1210614. Epub 2016 Aug 11. PMID: 27712113; PMCID: PMC5728104.

[xxxiv] Galbis-Reig D. A Case Report of Kratom Addiction and Withdrawal. WMJ. 2016 Feb;115(1):49-52; quiz 53. PMID: 27057581.

[xxxv] Arhin M, Mobley J, Hamad H, Remick P. Successful Management of Kratom Use Disorder With Buprenorphine and Naloxone. Cureus. 2023 Jun 29;15(6):e41146. doi: 10.7759/cureus.41146. PMID: 37519540; PMCID: PMC10386870.

[xxxvi] Tanna RS, Nguyen JT, Hadi DL, Manwill PK, Flores-Bocanegra L, Layton ME, White JR, Cech NB, Oberlies NH, Rettie AE, Thummel KE, Paine MF. Clinical Pharmacokinetic Assessment of Kratom (*Mitragyna speciosa*), a Botanical Product with Opioid-like Effects, in Healthy Adult Participants. Pharmaceutics. 2022 Mar 11;14(3):620. doi: 10.3390/pharmaceutics14030620. PMID: 35335999; PMCID: PMC8950611.

[xxxvii] Huestis, M.A.; Brett, M.A.; Bothmer, J.; Atallah, R. Human Mitragynine and 7-Hydroxymitragynine Pharmacokinetics after Single and Multiple Daily Doses of Oral Encapsulated Dried Kratom Leaf Powder. *Molecules* 2024, 29,984. https://doi.org/10.3390/molecules29050984.

[xxxviii] Tanna RS, Nguyen JT, Hadi DL, Manwill PK, Flores-Bocanegra L, Layton ME, White JR, Cech NB, Oberlies NH, Rettie AE, Thummel KE, Paine MF. Clinical Pharmacokinetic Assessment of Kratom (*Mitragyna speciosa*), a Botanical Product with

Opioid-like Effects, in Healthy Adult Participants. Pharmaceutics. 2022 Mar 11;14(3):620. doi: 10.3390/pharmaceutics14030620. PMID: 35335999; PMCID: PMC8950611.

[xxxix] Huestis, M.A.; Brett, M.A.; Bothmer, J.; Atallah, R. Human Mitragynine and 7-Hydroxymitragynine Pharmacokinetics after Single and Multiple Daily Doses of Oral Encapsulated Dried Kratom Leaf Powder. *Molecules* 2024, 29,984. https://doi.org/10.3390/molecules29050984.

[xl] Krotulski, AJ; Denn, MT; Brower, JO; Papsun, DM; Logan, BK. (2025) *Evaluation of Commercially Available Smoke Shop Products Marketed as "7-Hydroxy Mitragynine" & Related Alkaloids*, Center for Forensic Science Research an Education, United States.

[xli] Makary, M. Beware: Synthetic kratom—7-OH—is powering a new opioid crisis. New York Post. July 29, 2025. Available at https://nypost.com/2025/07/29/opinion/beware-synthetic-kratom-7-oh-powers-a-new-opioid-crisis/

[xlii] US Food and Drug Administration. 7-Hydroxymitragynine (7-OH): An Assessment of the Scientific Data and Toxicological Concerns Around an Emerging Opioid Threat. https://www.fda.gov/files/drugs/published/7-hydroxymitragynin_7-oh_an_assessment_of_the_scientific_data_and_toxicological_concerns_around_an_emerging_opioid_threat.pdf (stating "there are no FDA-approved drugs containing kratom or kratom-derived drug substances such as 7-OH for any therapeutic indications.").

[xliii] US Food and Drug Administration. FDA and Kratom. https://www.fda.gov/news-events/public-health-focus/fda-and-kratom.

[xliv] US Food and Drug Administration. The Drug Development Process: Step 3: Clinical Research. https://www.fda.gov/patients/drug-development-process/step-3-clinical-research. Accessed Dec. 23, 2025.

[xlv] U.S. Food Drug Administration. Step 3: Clinical Research. https://www.fda.gov/patients/drug-development-process/step-3-clinical-research. Accessed Dec. 30, 2025.

[xlvi] Eggleston W, Stoppacher R, Suen K, Marraffa JM, Nelson LS. Kratom Use and Toxicities in the United States. Pharmacotherapy. 2019 Jul;39(7):775-777. doi: 10.1002/phar.2280. Epub 2019 Jun 13. PMID: 31099038.

[xlvii] Hill K, Rogers JM, Grundmann O, Epstein DH, Smith KE. At least four groups of kratom consumers in the United States: latent-class analysis of motivations for kratom use. Am J Drug Alcohol Abuse. 2025 Mar 4;51(2):191-203. doi: 10.1080/00952990.2024.2414319. Epub 2025 Jan 30. PMID: 39883932.

[xlviii] Fowble K.L., Musah R.A. A Validated Method for the Quantification of Mitragynine in Sixteen Commercially Available Kratom (Mitragyna speciosa) Products. Forensic Science International 299 (2019) 195–202.

[xlix] King Kratom FAQs. https://kingkratom.com/faqs/. Accessed Dec. 29, 2025.

[l] Eggleston W, Stoppacher R, Suen K, Marraffa JM, Nelson LS. Kratom Use and Toxicities in the United States. Pharmacotherapy. 2019 Jul;39(7):775-777. doi: 10.1002/phar.2280. Epub 2019 Jun 13. PMID: 31099038.

[li] America's Poison Centers. Health Advisory: Serious Illnesses Associated with 7-OH Use. https://poisoncenters.org/news-alerts/13531044

[lii] Richardson E, Akkas F, Cadwallader AB. What Should Dietary Supplement Oversight Look Like in the US? AMA J of Ethics. Vol. 24 No. 5: E402–09. (May 2022). https://journalofethics.ama-assn.org/sites/joedb/files/2022-04/pfor1-peer-2205_0.pdf.

[liii] Eggleston W, Stoppacher R, Suen K, Marraffa JM, Nelson LS. Kratom Use and Toxicities in the United States. Pharmacotherapy. 2019 Jul;39(7):775-777. doi: 10.1002/phar.2280. Epub 2019 Jun 13. PMID: 31099038.

[liv] Ohio Department of Behavioral Health (2025). Ohio Substance Abuse Monitoring Network: Surveillance of Drug Use Trends in the State of Ohio: July – December 2024. Columbus, OH: State of Ohio.

[lv] Kratom-Derived Semi-Synthetic Opioids. Cayman Chemical. October 2025. https://cdn2.caymanchem.com/cdn/cms/caymanchem/LiteratureCMS/NPS%20Snapshot%20Kratom-Derived%20Semi-Synthetic%20Opioids.pdf

[lvi] Ohio Board of Pharmacy. Consumer and Retailer Notice: Kratom-Related Products Now Illegal in Ohio. http://pharmacy.ohio.gov/documents/pubs/special/kratom/consumer%20and%20retailer%20notice%20-%20kratom-related%20products%20now%20illegal%20in%20ohio.pdf. Accessed Jan. 2, 2025.

[lvii] Substance Abuse and Mental Health Services Administration. Key Substance use and Mental Health Indicators in the United States: Results from the 2021 National Survey on Drug Use and Health. https://www.samhsa.gov/data/sites/default/files/reports/rpt39443/2021NSDUHFFRRev010323.pdf. Accessed Dec. 23, 2025.
[lviii] Grinspoon P. Kratom: Fear-Worthy Foliage or Beneficial Botanical? https://www.health.harvard.edu/blog/kratom-fear-worthy-foliage-or-beneficial-botanical-2019080717466. Accessed Dec. 29, 2025.
[lix] Ohio Department of Behavioral Health (2025). Ohio Substance Abuse Monitoring Network: Surveillance of Drug Use Trends in the State of Ohio: July – December 2024. Columbus, OH: State of Ohio.
[lx] Tanna RS, Nguyen JT, Hadi DL, Manwill PK, Flores-Bocanegra L, Layton ME, White JR, Cech NB, Oberlies NH, Rettie AE, Thummel KE, Paine MF. Clinical Pharmacokinetic Assessment of Kratom (*Mitragyna speciosa*), a Botanical Product with Opioid-like Effects, in Healthy Adult Participants. Pharmaceutics. 2022 Mar 11;14(3):620. doi: 10.3390/pharmaceutics14030620. PMID: 35335999; PMCID: PMC8950611.
[lxi] Ohio Department of Behavioral Health (2025). Ohio Substance Abuse Monitoring Network: Surveillance of Drug Use Trends in the State of Ohio: July – December 2024. Columbus, OH: State of Ohio.
[lxii] Ohio Department of Behavioral Health (2025). Ohio Substance Abuse Monitoring Network: Surveillance of Drug Use Trends in the State of Ohio: July – December 2024. Columbus, OH: State of Ohio.
[lxiii] Ohio Department of Health. 2023 Ohio Drug Overdose Report. https://odh.ohio.gov/know-our-programs/violence-injury-prevention-program/media/2023-annual-ohio-drug-overdose-report. Accessed Dec. 31, 2025.
[lxiv] Tanna RS, Nguyen JT, Hadi DL, Manwill PK, Flores-Bocanegra L, Layton ME, White JR, Cech NB, Oberlies NH, Rettie AE, Thummel KE, Paine MF. Clinical Pharmacokinetic Assessment of Kratom (*Mitragyna speciosa*), a Botanical Product with Opioid-like Effects, in Healthy Adult Participants. Pharmaceutics. 2022 Mar 11;14(3):620. doi: 10.3390/pharmaceutics14030620. PMID: 35335999; PMCID: PMC8950611;
[lxv] US Food and Drug Administration. FDA and Kratom. https://www.fda.gov/news-events/public-health-focus/fda-and-kratom.
[lxvi] Ohio State Unintentional Drug Overdose Reporting System (SUDORS). Analysis: ODH Chronic Disease, Violence, and Injury Epidemiology Section. Data pulled 8/15/2025. Includes Ohio residents who died in Ohio due to unintentional drug overdose with at least one overdose-specific circumstance field documented between 2019 - 2024 (N=26,471). SUDORS data for the 2024 data year is not yet complete.
[lxvii] George S Behonick, Christina Vu, Larry Czarnecki, Maisie El-Ters, Kevin G Shanks, Two Single-Drug Fatal Intoxications by Mitragynine, *Journal of Analytical Toxicology*, Volume 46, Issue 5, June 2022, Pages e110–e114, https://doi.org/10.1093/jat/bkac016
[lxviii] Mata DC, Chang HH. Postmortem Mitragynine Distribution in a Single Drug Fatality Case. *Academic Forensic Pathology*. 2023;13(1):34-40. doi:10.1177/19253621231160417
[lxix] Overbeek, D. L, Abraham, J., & Munzer, B. W. (2019). Kratom (Mitragynine) Ingestion Requiring Naloxone Reversal. *Clinical Practice and Cases in Emergency Medicine*, 3(1). http://dx.doi.org/10.5811/cpcem.2018.11.40588
[lxx] McCurdy CR, Sharma A, Smith KE, Veltri CA, Weiss ST, White CM et al. An update on the clinical Pharmacology of kratom: uses, abuse potential and future considerations. Expert Rev Clin Pharmacol. 2024.
[lxxi] Harrison A. State Senator Sponsors Bill to Ban Kratom, “Gas Station Heroin” in Utah. KJZZ14. Nov. 14, 2025.
[lxxii] Harrison A. State Senator Sponsors Bill to Ban Kratom, “Gas Station Heroin” in Utah. KJZZ14. Nov. 14, 2025. https://kjzz.com/news/local/state-senator-sponsors-bill-to-ban-kratom-gas-station-heroin-in-utah.
[lxxiii] Pitts E. Utah Lawmaker Argues for Kratom Ban to Protect Public Health Against “Gas Station Heroin.” Desert News. Nov. 19, 2025. https://www.deseret.com/utah/2025/11/19/senator-mckell-argues-for-kratom-ban-to-protect-public-health/.
[lxxiv] Karim, F, Hampton, T, Truong, G. Maternal Kratom Use: A Cause of Neonatal Opioid Withdrawal Syndrome - A Case Series and Literature Review. Neonatology Today. Sept. 2022, pp. 117-19; US Food and Drug Administration. FDA and Kratom. https://www.fda.gov/news-events/public-health-focus/fda-and-kratom
[lxxv] Faucher, M.A., Morillos, S., Cordova, P., McNeil-Santiel, J., Onisko, N., Adhikari, E.H. and Nelson, D.B. (2024), Kratom (Mitragyna speciosa): A Case Review of Use Before and During Pregnancy. J Midwifery Womens Health., 69: 144-149. https://doi.org/10.1111/jmwh.13558.

[lxxvi] Eggleston W, Stoppacher R, Suen K, Marraffa JM, Nelson LS. Kratom Use and Toxicities in the United States. Pharmacotherapy. 2019 Jul;39(7):775-777. doi: 10.1002/phar.2280. Epub 2019 Jun 13. PMID: 31099038.

[lxxvii] Wright ME, Ginsberg C, Parkison AM, Dubose M, Sherbondy M, Shores E. Outcomes of mothers and newborns to prenatal exposure to kratom: a systematic review. J Perinatol. 2021 Jun;41(6):1236-1243. doi: 10.1038/s41372-021-00952-8. Epub 2021 Feb 15. Erratum in: J Perinatol. 2022 Mar;42(3):420. doi: 10.1038/s41372-021-01212-5. PMID: 33589723; PMCID: PMC8225511.

[lxxviii] Riley AL, Nelson KH, To P, López-Arnau R, Xu P, Wang D, Wang Y, Shen HW, Kuhn DM, Angoa-Perez M, Anneken JH, Muskiewicz D, Hall FS. Abuse potential and toxicity of the synthetic cathinones (i.e., "Bath salts"). Neurosci Biobehav Rev. 2020 Mar;110:150-173. doi: 10.1016/j.neubiorev.2018.07.015. Epub 2019 May 14. PMID: 31101438; PMCID: PMC8617600.

[lxxix] Super Speciosa. https://superspeciosa.com/. Accessed Dec. 31, 2025.

[lxxx] US Food and Drug Administration. FDA and Kratom. https://www.fda.gov/news-events/public-health-focus/fda-and-kratom. Accessed Dec. 31, 2025.

[lxxxi] US Food and Drug Administration. 7-Hydroxymitragynine (7-OH): An Assessment of the Scientific Data and Toxicological Concerns Around an Emerging Opioid Threat. https://www.fda.gov/files/drugs/published/7-hydroxymitragynin_7-oh_an_assessment_of_the_scientific_data_and_toxicological_concerns_around_an_emerging_opioid_threat.pdf. Accessed Dec. 31, 2025.

[lxxxii] US Food and Drug Administration. 7-Hydroxymitragynine (7-OH): An Assessment of the Scientific Data and Toxicological Concerns Around an Emerging Opioid Threat. https://www.fda.gov/files/drugs/published/7-hydroxymitragynin_7-oh_an_assessment_of_the_scientific_data_and_toxicological_concerns_around_an_emerging_opioid_threat.pdf. Accessed Dec. 31, 2025.

[lxxxiii] Laboratory Analysis of Kratom Products for Heavy Metals. https://www.fda.gov/news-events/public-health-focus/laboratory-analysis-kratom-products-heavy-metals

[lxxxiv] Snow Caroti K, Joseph A, Sapowadia A, Michael White C. Elemental impurities (heavy metals) in kratom products: an assessment of published individual product analyses. Clin Toxicol (Phila). 2024 Oct;62(10):651-660. doi: 10.1080/15563650.2024.2395552. Epub 2024 Sep 5. PMID: 39235176.

[lxxxv] Centers for Disease Control and Prevention. 2018 Salmonella Infections Linked to Kratom (Final Update). https://archive.cdc.gov/www_cdc_gov/salmonella/kratom-02-18/index.html

[lxxxvi] Prozialeck W, Fowler A, Edwards J. Public Health Implications and Possible Sources of Lead (Pb) as a Contaminant of Poorly Regulated Kratom Products in the United States. Toxics. 2022 Jul 19;10(7):398. doi: 10.3390/toxics10070398. PMID: 35878303; PMCID: PMC9320411.

[lxxxvii] Sekar A, Velani S, Katzman S, O'Donnell M, Conway KS. Suspected Fanconi syndrome from cadmium toxicity exacerbated by heavy kratom use. A rare occurrence. Clin Toxicol (Phila). 2022 Jul;60(7):888-889. doi: 10.1080/15563650.2022.2046774. Epub 2022 Mar 24. PMID: 35323068.

[lxxxviii] World Health Organization. Pre-Review Report: Kratom (Mitragyna speciosa), mitragynine, and 7-hydroxymitragynine. Expert Committee on Drug Dependence Forty-fourth Meeting Geneva, 11-15 October 2021. http://cdn.who.int/media/docs/default-source/controlled-substances/unedited--advance-copy-44th-ecdd-review-report_kratom.pdf?sfvrsn=8d699207_8&download=true

[lxxxix]Zul Aznal AN, Mohamad Nor Hazalin NA, Hassan Z, Mat NH, Chear NJ, Teh LK, Salleh MZ, Suhaimi FW. Adolescent kratom exposure affects cognitive behaviours and brain metabolite profiles in Sprague-Dawley rats. Front Pharmacol. 2022 Nov 28;13:1057423. doi: 10.3389/fphar.2022.1057423. PMID: 36518677; PMCID: PMC9744228.

[xc] Suwanlert S: A study of kratom eaters in Thailand. Bull Narc 1975; 27: 21–27; McWhirter L, Morris S. A Case Report of Inpatient Detoxification after Kratom (Mitragyna speciosa) Dependence. Eur. Addict Res 2010; 16:229–231.

[xci] Eggleston W, Stoppacker R, Suen K, Marraffa JM, Nelson LS. Kratom Use and Toxicities in the United States. Pharmacotherapy. Vol. 39. No. 7 (2019).

[xcii] European Union Drugs Agency. Kratom Drug Profile. https://www.euda.europa.eu/publications/drug-profiles/kratom_en#pharmacology; US Food and Drug Administration. FDA and Kratom. https://www.fda.gov/news-events/public-health-focus/fda-and-kratom; US Drug Enforcement Administration. Kratom. https://www.dea.gov/factsheets/kratom. Accessed Dec. 18, 2025; Mayo Clinic. Kratom: Unsafe and Ineffective.

https://www.mayoclinic.org/diseases-conditions/prescription-drug-abuse/in-depth/kratom/art-20402171. Accessed Dec. 23, 2025.

[xciii] US Food and Drug Administration. FDA and Kratom. https://www.fda.gov/news-events/public-health-focus/fda-and-kratom. Accessed Dec. 31, 2025.

[xciv] World Health Organization. Pre-Review Report: Kratom (Mitragyna speciosa), mitragynine, and 7-hydroxymitragynine. Expert Committee on Drug Dependence Forty-fourth Meeting Geneva, 11-15 October 2021. http://cdn.who.int/media/docs/default-source/controlled-substances/unedited--advance-copy-44th-ecdd-review-report_kratom.pdf?sfvrsn=8d699207_8&download=true

[xcv] An Ohio woman thought kratom was just another energy drink. It ruined her life, sent her to rehab. https://www.beaconjournal.com/story/news/2025/08/06/ohio-kratom-7oh-addiction-fda/85541942007/?taid=68937889698d6b0001e70a0e&utm_campaign=trueanthem&utm_medium=social&utm_source=twitter. Accessed Dec. 24, 2025.

[xcvi] Feel Free customers say the kratom drink is making them sick. Toothless FDA rules on dietary supplements are helping it remain a bestseller. https://fortune.com/2025/12/28/kratom-drink-feel-free-fda-supplements-labeling-lawsuit/. Accessed Jan. 5, 2026.

[xcvii] 1836 Kratom. 1836 Series: Intro & Our Perspective on 7OH. https://www.1836kratom.com/cinema. Accessed Dec. 24, 2025; Super Speciosa. How to Prepare Kratom Powder. https://superspeciosa.com/blogs/blog/how-to-prepare-kratom-powder. Accessed Dec. 30, 2025.

[xcviii] 1836 Kratom. 1836 Series: Intro & Our Perspective on 7OH. https://www.1836kratom.com/cinema. Accessed Dec. 24, 2025; Super Speciosa. Red Maeng Da Kratom Powder. https://superspeciosa.com/products/red-maeng-da-kratom-powder?selling_plan=5215191261. Accessed Dec. 23, 2025.

[xcix] European Union Drugs Agency. Kratom Drug Profile. https://www.euda.europa.eu/publications/drug-profiles/kratom_en#pharmacology.

[c] Riley AL, Nelson KH, To P, López-Arnau R, Xu P, Wang D, Wang Y, Shen HW, Kuhn DM, Angoa-Perez M, Anneken JH, Muskiewicz D, Hall FS. Abuse potential and toxicity of the synthetic cathinones (i.e., "Bath salts"). Neurosci Biobehav Rev. 2020 Mar;110:150-173. doi: 10.1016/j.neubiorev.2018.07.015. Epub 2019 May 14. PMID: 31101438; PMCID: PMC8617600.

[ci] Kratom-Derived Semi-Synthetic Opioids. Cayman Chemical. October 2025. https://cdn2.caymanchem.com/cdn/cms/caymanchem/LiteratureCMS/NPS%20Snapshot%20Kratom-Derived%20Semi-Synthetic%20Opioids.pdf