



Geneva Institute of International Relations

**CATEGORIZATION AND CONTROL:
AN EXAMINATION OF NARCOTIC, PSYCHOTROPIC,
AND SYNTHETIC SUBSTANCES UNDER THE REPUBLIC
OF KOREA'S NARCOTICS CONTROL ACT**

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I. Introduction¹

The **Republic of Korea (South Korea)** successfully preserved its reputation as a ‘drug-free’ or ‘drug-clean’ nation for decades,² a status largely attributable to the robust enforcement efforts instituted by the Supreme Prosecutors’ Office, commencing with the establishment of the **Narcotics & Organized Crimes Department** in 1989.³ This trend, however, took a turn of events when the Yoon administration and the **People Power Party** declared a ‘war on drugs’ in 2022.⁴ This political declaration follows a shift since 2015, wherein online networks and smartphones replaced traditional in-person drug commerce, facilitating non-face-to-face transactions via social media and the dark web.⁵ This shift has placed South Korea on the global drug market map as the country with the second most expensive marijuana, following Japan.⁶

This paper will detail different types of drugs controlled within South Korea and their characteristics.

A. Definition

The term ‘narcotics’ is derived from the Greek word νάρκω (narkō) or nárkē, signifying “numbness” or “to make numb,” and refers to substances characterized by specific pharmacological effects that induce sedation, analgesia/pain relief, euphoria, and the potential for addiction.⁷ Their mechanism of action is to act on specific receptors in the brain and spinal cord, blocking pain signals and producing feelings of well-being. Narcotics have a high potential for abuse, can lead to physical and psychological dependence, and their misuse can result in severe health and social harms.⁸

World Health Organization (WHO) defines ‘psychoactive substance’ as follows: 1) that the desire to use it is so strong as to be compulsive, leading users to develop dependence; 2) there is a tendency to increase the amount used, resulting in tolerance; 3) intolerable symptoms, known as withdrawal symptoms, appear throughout the body upon discontinuation

¹ For the purpose of this paper as a legal research, its footnote has followed the Bluebook citation.

² Song-hyun Kim & Eunsan Kwak, *Korea, once called a “drug-clean country,” has become a “major global drug sales channel.”*, Maeil Business Newspaper (Apr. 18, 2025, 5:55 AM), <https://www.mk.co.kr/en/society/11294732>.

³ *History of Supreme Prosecutors' Office*, Supreme Prosecutors' Office, <https://www.spo.go.kr/site/eng/01/10105040000002018120605.jsp> (last visited Sept. 16, 2025).

⁴ Jeong-bong Kim, *Seoul's Drug Problem Has Become So Severe That the City Has Formed a Special Team to Combat It*, Korea JoongAng Daily (Oct. 26, 2022, 6:46 PM), <https://koreajoongangdaily.joins.com/2022/10/26/national/socialAffairs/korea-drugs-drug-smuggling/20221026184624813.html>.

⁵ Shon Duk-ho, *Foreign drug offenders in South Korea reach record high of 3,232 amid crackdown*, Chosun Ilbo (June 15, 2025), <https://biz.chosun.com/en/en-society/2025/06/15/ZYRQWZWR2ND5NG76OVVH7ETARI/>.

⁶ Sean Williams, *10 Cities With the Most and Least Expensive Marijuana in the World*, Yahoo Finance: The Motley Fool (Feb 12, 2018), <http://finance.yahoo.com/news/10-cities-most-least-expensive-164100003.html>.

⁷ *Narcotics*, Dictionary.com, <https://www.dictionary.com/browse/narco> (last visited Sept. 4, 2025).

⁸ Vedantu.com, *Narcotic Drugs: Definition, Types, Examples, Effects and Abuses*, Vedantu, <https://www.vedantu.com/biology/narcotic> (last visited Sept. 14, 2025).

of use; and 4) the substance causes harm not only to the individual but also to society.⁹ For scientific and medical scheduling, the **WHO Expert Committee on Drug Dependence (ECDD)** assesses the dependence liability and therapeutic usefulness of each substance before recommending its status to international treaty bodies.

The **United Nations Office of Drugs and Crime (UNODC)** provides a list of ‘narcotic drug’ as natural or synthetic substances in Schedules I and II of the **Single Convention on Narcotic Drugs, 1961 (1961 Convention)**,¹⁰ and that Convention as amended by the **1972 Protocol Amending the Single Convention on Narcotic Drugs, 1961 (1972 Protocol)**.¹¹ The International Narcotics Control Board (INCB) supervises both the 1961 Convention and the 1972 Protocol.¹²

South Korea categorizes ‘narcotics’ into narcotic drugs, psychotropic substances, and cannabis.¹³ Narcotic drugs include poppy, opium, coca leaves, all alkaloids and chemical compounds derived from them, and any mixture or concoction of these substances. A ‘psychotropic substance’ is defined as any drug with the potential to affect the human central nervous system, thereby presenting a serious risk of harm or danger to an individual upon its misuse or abuse. The psychotropic substance subcategories are summarized in the following table.

Table 1: Similarities and Differences Among ‘psychotropic substances’ under Article 2 of the Narcotics Control Act

Feature	Category (a)	Category (b)	Category (c)	Category (d)	Category (e)
Potential for Abuse	<i>High</i> potential for misuse or abuse.	<i>High</i> potential for misuse or abuse.	<i>Relatively lower</i> potential for misuse or abuse than (a) and (b).	<i>Relatively lower</i> potential for misuse or abuse than (c).	Contains drugs from categories (a) through (d).
Medical Use	<i>Not currently accepted</i> medical use in treatment.	<i>Very limited</i> medical use in treatment.	Currently has an <i>accepted</i> medical use in treatment.	Currently has an <i>accepted</i> medical use in treatment.	Contains drugs that may or may not have medical use.
Potential for Dependence	May lead to <i>severe</i> physical or	May lead to <i>severe</i> physical or	May lead to <i>mild</i> physical or severe	May lead to <i>milder</i> physical or	The dependence potential is determined by the

⁹ World Health Org., *The ICD-10 Classification of Mental and Behavioural Disorders: Diagnostic Criteria for Research* (1993), <https://iris.who.int/bitstream/handle/10665/37108/9241544554.pdf?sequence=1>.

¹⁰ Single Convention on Narcotic Drugs, Mar. 30, 1961, 520 U.N.T.S. 204, 40, https://www.unodc.org/pdf/convention_1961_en.pdf.

¹¹ United Nations Office on Drugs and Crime, *The Work of the United Nations in the Field of Narcotic Drugs*, 24 Bulletin on Narcotics 2, https://www.unodc.org/unodc/en/data-and-analysis/bulletin/bulletin_1972-01-01_3_page002.html.

¹² International Narcotics Control Board, *About INCB*, INCB, <https://www.incb.org/incb/en/about.html> (last visited Sept. 16, 2025).

¹³ Narcotics Control Act, Act No. 20512, art. 2 (Oct. 22, 2024).

	psychological dependence.	psychological dependence.	psychological dependence.	psychological dependence than (c).	drugs contained within the mixture.
Nature of Substance	A single drug or a substance containing it.	A single drug or a substance containing it.	A single drug or a substance containing it.	A single drug or a substance containing it.	A mixture or concoction of drugs from other categories.
Special Conditions	-	-	-	-	Excludes mixtures that cannot be re-prepared and do not cause dependence.
Examples	Category (a): Lysergic acid diethylamide (LSD), Methcathinone, Kratom, JWH-018, etc.				
	Category (b): Amphetamine, Methamphetamine, Methylenedioxymethamphetamine (MDMA), Ketamine, etc.				
	Category (c): Barbitol, Lysergic acid amide, Flunitrazepam, etc.				
	Category (d): Diazepam, Fenfluramine, Zolpidem, Gamma-Hydroxybutyrate (GHB), Zopiclone, Propofol, etc.				

Source: Narcotics Control Act, Act No. 20512, art. 2 (Oct. 22, 2024).

Under the **Narcotics Control Act**, the definition of ‘cannabis’ encompasses the plant and its derivatives, but specifically excludes the seeds, roots, and mature stalks of *Cannabis sativa L.*, thereby limiting the scope of criminalization to the psychoactive component.

Other than strict control over narcotics, South Korea takes additional measures to oversee the handling of different types of drugs to mitigate any possible mishandling or misuse of them. First, it's the Minister of Food and Drug Safety who further defines ‘temporary narcotics’ when their misuse or abuse is likely to cause harm or danger to public health and requires urgent regulation equivalent to that imposed on narcotics.¹⁴ Its subcategories can be summarized in the following table.

Table 2: Similarities and Differences Among ‘temporary narcotics’ under Article 2 of the Narcotics Control Act

Group 1	Group 2
highly likely to result in physical or psychological harm or danger,	likely to result in physical or psychological harm or danger
by affecting the central nervous system, or causing dependence on them,	by causing dependence thereon.
similar to narcotics in structure and effect	
Examples: 1V-LSD, LSZ, etc.	Examples: CH-PIATA, Cumyl-4CN-B7AICA, etc.

¹⁴ Narcotics Control Act, Act No. 20512, art. 5 (Oct. 22, 2024).

Source: Narcotics Control Act, Act No. 20512, art. 5 (Oct. 22, 2024).

Prior to designating a substance as a temporary narcotic, the Minister of Food and Drug Safety must consult with the relevant agencies prescribed by Presidential Decree and issue prior public notification of the following details in the Official Gazette and on the Ministry's website (www.mfds.go.kr) for at least 1 month. Following the official designation of temporary narcotics, these must be publicly announced in the Official Gazette and posted on the website: 1) the reasons for designating the temporary narcotics; 2) the names of the temporary narcotics; 3) the classification as Group 1 or Group 2 temporary narcotics; 4) matters concerning the prior notification, such as the notification period for designation; and 5) matters concerning the official designation, such as the designation period.

The temporary narcotics subject to prior notification shall be effective from the date of preannouncement until the day preceding the official public announcement of designation. Where pre-designated temporary narcotics are officially designated, the designation shall be made for a period not exceeding three years.

Second, **South Korea's** Presidential Decree prescribes 'precursor' as a substance that is not a narcotic but is utilized for the manufacture of narcotic drugs or psychotropic substances.¹⁵ Any person exporting or importing precursors must obtain approval from the Minister of Food and Drug Safety and keep track of every transaction.¹⁶ They shall report it to the Minister of Food and Drug Safety or the Minister of Justice without delay, when: 1) the purpose of precursors is uncertain or the precursors may be used for the illegal manufacture of narcotic drugs and psychotropic substance; or 2) when precursors exceeding the amount prescribed by Presidential Decree have been stolen, are missing, or have been involved in any other incident. The person handing precursors and filing a report as well as the public official who has received the report shall maintain the confidentiality of the reported information.

Third, the **Ministry of Food and Drug Safety** (MFDS) published a regulatory provision, effective since October 23, 2009, under the Enforcement Decree of the Narcotics Control Act, to permit the carriage of medicines containing either narcotic drugs or psychoactive substances into South Korea, provided such medication is strictly for the traveler's personal treatment.¹⁷ To comply with this mandate, any individual, irrespective of nationality, intending to enter the **Republic of Korea** with these controlled medicines, even with the doctor's prescription, must apply for and obtain a requisite permit from the MFDS, as the permit is not issued by the Embassy. As of December 27, 2024, the application process can be completed online (<https://nedrug.mfds.go.kr>).

¹⁵ Enforcement Decree of The Narcotics Control Act, Presidential Decree No. 35252 (S. Kor.) (Feb. 6, 2025).

¹⁶ Narcotics Control Act, Act No. 20512, art. 51 (Oct. 22, 2024).

¹⁷ *Supra* note 14.

II. Categories of Narcotics (in the order of appearance in this paper)

* IV: intravenous = absorption through veins, IM: intramuscular = absorption into muscles, N/A: not applicable as it is not a stimulant

☆ NPS: New Psychoactive Substance = psychoactive substance that newly emerged and detected in the market, known by terms such as 'designer drugs', 'legal highs', 'herbal highs', 'bath salts', 'research chemicals' and 'laboratory reagents.'¹⁸

	Name	Effect severity	Intake method	Onset time	Duration
Narcotic drugs	poppy / opium poppy	baseline	oral/smoked	10-30 minutes	3-6 hours
	opium / raw opium	baseline	oral/smoked	10-30 minutes	3-6 hours
	morphine	baseline	IV	within minutes	3-6 hours
	codeine / methyl morphine	1/6 of morphine	oral	30-60 minutes	4-6 hours
	heroin / diacetylmorphine	10 times morphine	IV	within seconds	3-6 hours
			smoked/snorted	within minutes	
	cocaine	stronger than opium or morphine, with no numeric ratio	smoked/snorted	20-30 seconds	5-10 minutes
			oral	5-10 minutes	
	pethidine / phenylpiperidines	0.083 times morphine	IV/IM	10-15 minutes	2-4 hours
	diphenoxylate	0.01 times morphine	oral	30-60 minutes	8-12 hours
	fentanyl	200 times morphine, 100 times heroin	IV	1-2 minutes	30-60 minutes
			transdermal/patch	15 minutes	72 hours
	diphenoxylate	0.1 to 0.01 times morphine	oral	1 hour	6-12 hours
	methadone / diphenylheptylamine	11 times morphine	IV/oral	30-60 minutes	8-36 hours
	acetylmethadol / levo-alpha-acetylmethadol / LAAM	15 times morphine, 1.4 times methadone	oral	1-2 hours	48-72 hours
dipipanone	2.5 times morphine	oral	30-60 minutes	4-8 hours	
		IM	30 min		

¹⁸ U.N. Office on Drugs & Crime, *Questions and Answers on NPS* (2013), https://www.unodc.org/documents/frontpage/Qs_and_As_on_NPS.pdf.

	Name	Effect severity	Intake method	Onset time	Duration
Psychotropic substances	methamphetamine ☆	2 times morphine, as baseline	oral	5-60 minutes	2-4 hours
			smoked/snorted	faster	
	methylenedioxyamphetamine / MDMA	3 times methamphetamine	oral	30-60 minutes	3-6 hours
			snorted	10-30 minutes	2-5 hours
			IV	Within 15 minutes	2-5 hours
	lysergic acid deethylamide / LSD / acid	300 times methamphetamine	oral	30-60 minutes	8-12 hours
	kratom / biak-biak ☆	weaker than opium, 0.001 times methamphetamine	oral	5-10 minutes	2-5 hours
	tryptamines ☆	*context dependent: weaker for stimulant, while stronger for hallucination than methamphetamine	oral	20-60 minutes	2-8 hours
	methylenedioxypropylamphetamine / MDPV ☆	10 times methamphetamine	oral	15-30 minutes	2-3 weeks, may last weeks if binged
			snorted	within 15 minutes	
	ketamine hydrochloride / ketamine ☆	stronger than methamphetamine	IV	30 seconds	1-6 hours
			IM	15 minutes	
	yaba	0.3 times methamphetamine	oral	30 minutes	12-30 hours
	benzylpiperazine / BZP ☆	0.1 times methamphetamine	oral	30-60 minutes	4-8 hours
			snorted	10-30 minutes	
	salvia divinorum / salvia ☆	weaker for stimulant, while 1000 times stronger for hallucination than methamphetamine	smoked	Within seconds	15 minutes
diethyl-barbituric acid / barbital	weaker than methamphetamine	oral	30-60 minutes	6-8 hours	
lysergic acid amide / LSA	N/A	oral	20-90 minutes	5-10 hours	
flunitrazepam	N/A	oral	15-30 minutes	12-24 hours	
nalbuphine / nubain	2.3 times morphine, 8.3 times codeine	IM	10-15 minutes	3-6 hours	
dextromethorphan	weaker than opium	oral	15-30 minutes	3-6 hours	
carisoprodol	N/A	oral	30-60 minutes	4-6 hours	

	fenfluramine / FFA	0.3 times methamphetamine	oral	30-60 minutes	8-12 hours
	gamma hydroxy butyrate / GHB	N/A	IV/oral	10-20 minutes	1-3 hours
	propofol	N/A	IV	30-60 seconds	5-10 minutes

	Name	Effect severity	Intake method	Onset time	Duration
Cannabis	cannabis herb / cannabis sativa linne	Baseline THC	smoked	5-10 minutes	1-4 hours
			oral	30-60 minutes	4-8 hours
	hashish	10 times THC	smoked	5-10 minutes	1-4 hours
	hashish oil	5 times THC	oral	within minutes	4-6 hours
	HU-210☆	200 times THC	oral/smoked	15-60 minutes	6-12 hours
	CP-47497☆	10 times THC	smoked	15-30 minutes	4-5 hours
	JWH-018	8 times THC	smoked	5-15 minutes	1-2 hours
	AM-2201	10 times THC	smoked	5-15 minutes	1-2 hours

A. Narcotic drugs

Under the Narcotics Control Act, ‘narcotic drugs’ constitute the most rigorously regulated class of substances, encompassing both natural, plant-derived compounds and potent synthetic derivatives.

i. Natural narcotics

Natural narcotics are chemically defined by the naturally occurring alkaloids extracted from plants such as the opium poppy and the coca bush.

a. Poppy

Poppy or opium poppy, also called ‘aeng-sok’ or ‘yang-gwi-bi’ in Korean, is categorized under natural narcotics. While the species encompasses several varieties, **South Korea** law specifically prohibits the cultivation of *Papaver somniferum L.*, *Papaver setigerum DC.*, and *Papaver bracteatum*.¹⁹ Around the 4th century B.C., the Greek physician **Hippocrates** recommended using a liquid extracted from the poppy for treating illnesses. From 300 B.C., the opium poppy, an annual plant, grows in temperate and subtropical climates and is cultivated around the Mediterranean coast.²⁰ Today, it is grown almost worldwide, centered on the ‘Golden Crescent’ region, the border areas of **Afghanistan, Pakistan, and Iran**.²¹

When juice is extracted from the poppy fruit and refined into a solid, it becomes opium. In **South Korea**, poppy cultivation is mainly for purposes other than opium extraction, such as use as a home remedy, treating animals, or ornamental purposes in rural and mountain areas.

b. Opium

Opium or raw opium, is a dark brown mass created by drying the milky extract from an unripe poppy fruit at temperatures below 60°C to preserve alkaloids.²² The first record of opium by humanity is from around 5,000 B.C., when people living in present-day **Iraq** engraved

¹⁹ Haruyo Asahina et al., *Studies of poppies and opium*, 2 U.N. Office on Drugs & Crime Bull. on Narcotics 20 (1957), https://www.unodc.org/unodc/en/data-and-analysis/bulletin/bulletin_1957-01-01_2_page006.html.

²⁰ Aurélie Salavert et al., *Direct dating reveals the early history of opium poppy in western Europe*, 10 Sci. Rep. 19747 (2020), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7679390/>.

²¹ Zhang Yong-an, *Asia, International Drug Trafficking, and U.S.-China Counternarcotics Cooperation*, Brookings Inst., Ctr. for Northeast Asian Policy Studies, CNAPS Visiting Fellow Working Paper (Feb. 2012), https://www.brookings.edu/wp-content/uploads/2016/06/02_drug_trafficking_zhang_paper.pdf.

²² V. A. Shevelev et al., *Mechanical drying of raw opium*, 2 U.N. Office on Drugs & Crime Bull. on Narcotics 6 (1958), https://www.unodc.org/unodc/en/data-and-analysis/bulletin/bulletin_1958-01-01_2_page003.html.

knowledge about opium on stones.²³ **China**, under the Qing dynasty, fought the Opium War with Britain from 1840 to 1842 and completely banned poppy cultivation in 1906.²⁴ It is mainly manufactured in **India, Turkey, Yugoslavia, and Pakistan**.²⁵

Historically, in folk medicine, opium was utilized for its potent analgesic properties and was occasionally administered for emergency illnesses.²⁶ Initial consumption may induce a state of dreamy euphoria; however, protracted use invariably results in severe addiction, necessitating a continually increased dosage to reproduce the original effect. Furthermore, the sustained abuse of opium typically renders users' complexions pale, often causing irritability in their personality, alongside various severe side effects, including loss of appetite and libido, nausea, vomiting, constipation, flushing, miosis/pupil constriction, and respiratory complications. Withdrawal symptoms typically peak about 72 hours after cessation, being especially severe and uncomfortable.

ii. Extracted Alkaloids

Extracted alkaloids, including substances like morphine and cocaine, form a legally distinct subclass because their concentrated pharmacological effects necessitate a heightened degree of regulatory scrutiny compared to their raw botanical sources.

a. Morphine

Morphine is a strong analgesic alkaloid extracted from opium, after removing impurities and undergoing a certain chemical reaction.²⁷ In 1805, German pharmacist **Sertürner** first isolated morphine from opium poppy and named it after Morpheus, the Greek god of dreams.

Morphine extracted from opium has excellent analgesic, sedative, and antitussive effects.²⁸ Its mechanism of action involves binding to opioid receptors in the brain and spinal cord, reducing the transmission of pain signals and inducing a sense of euphoria.

While morphine retains critical utility in the management of severe pain, its high potential for abuse necessitates rigorous control, as it can lead to profound physical and psychological

²³ Michael's House, *History of Opiates*, <https://michaelshouse.com/opiate-rehab/history-of-opiates/> (last visited Sept. 19, 2025).

²⁴ James Windle, *Harms Caused by China's 1906-17 Opium Suppression Intervention*, 24 Int'l J. Drug Pol'y 498 (2013), <https://repository.uel.ac.uk/download/48f2cb7a02646f510ccec4a0566d80e532f8ef5ba7775eeba124d7a4ed60364c/248399/Harms%20caused%20by%201906%20intervention%20-%20pre-print%20copy.pdf>.

²⁵ Vladimir Kušvić, *Cultivation of the opium poppy and opium production in Yugoslavia*, 2 U.N. Office on Drugs & Crime Bull. on Narcotics 5 (1960), https://www.unodc.org/unodc/en/data-and-analysis/bulletin/bulletin_1960-01-01_2_page003.html.

²⁶ Shri C. Dwarakanath, *Use of opium and cannabis in the traditional systems of medicine in India*, 1 U.N. Office on Drugs & Crime Bull. on Narcotics 15 (1965), https://www.unodc.org/unodc/en/data-and-analysis/bulletin/bulletin_1965-01-01_1_page004.html.

²⁷ Chandrasekhar Krishnamurti & SSC Chakra Rao, *The isolation of morphine by Sertürner*, 60 Indian J. Anaesth. 861 (2016), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5125194/>.

²⁸ *Morphine Withdrawal and Detox*, Addiction Center, <https://www.addictioncenter.com/opiates/morphine/withdrawal-detox/> (last updated Feb. 25, 2025).

dependence, along with vomiting, sweating, fever, and diarrhea, and cause life-threatening respiratory depression. When its use is discontinued, it causes severe withdrawal symptoms. People addicted to morphine typically use it three times a day with a dosage of 10-20 milligrams (mg) per use.²⁹ Severely addicted individuals may use up to 120 mg per day, and taking more than 200 mg at once can cause respiratory failure, which is the major cause of death in morphine overdose for most users.

b. Codeine

Codeine, 3-methylmorphine, is an opiate alkaloid that appears as an odorless white crystal, crystalline powder, tablet, capsule, or as a liquid solution, like cold medicine.³⁰ Its primary clinical application involves its potent antitussive and milder analgesic properties, used to suppress coughs and manage moderate pain. Its physical dependence is relatively low, but misuse can cause psychological and physical dependence and withdrawal symptoms. Codeine is occasionally used in step-down therapies for opioid or heroin dependence in clinical contexts, though other medications have largely replaced this practice.

c. Heroin

Heroin or diacetylmorphine is an odorless substance that presents as a white, light brown, or dark brown powder.³¹ It is manufactured as an acetyl compound through the chemical treatment of morphine base with acetic anhydride, activated carbon, hydrochloric acid, and other reagents. This process is undertaken following the initial preparation of raw opium extracted from the poppy fruit via a sequence of mixing, precipitation, filtering, and heating with slaked lime, water, and ammonium chloride. As a central nervous system depressant, heroin acts to suppress feelings of tension, anger, and fear, simultaneously inducing states of euphoria and intoxication.³² Given its chemical derivation from morphine, its general pharmacological effects are analogous.

Heroin, whose name was derived from the German word 'Heroisch' (meaning 'heroic' or 'powerful'), was first synthesized in 1874 and subsequently marketed by the German company **Bayer** in 1898 as a commercial analgesic.³³ Nevertheless, due to its severe addictiveness, the

²⁹ Pfizer, Inc., *Drug Labeling for Id.* No. 20063, <https://labeling.pfizer.com/ShowLabeling.aspx?id=20063> (last visited Sept. 19, 2025).

³⁰ Gerald F. O'Malley & Rika O'Malley, *Opioid Toxicity and Withdrawal*, MSD Manual Pro. Ed., <https://www.msmanuals.com/professional/special-subjects/illegal-drugs-and-intoxicants/opioid-toxicity-and-withdrawal> (last modified Apr. 2025).

³¹ *The Opium Kings: Adrian Cowell's 30-Year Chronicle of Burma's Heroin Trade and the Rise and Fall of Warlord Khun Sa*, PBS & WGBH (May 20, 1997), <https://www.pbs.org/wgbh/pages/frontline/shows/heroin/transform/>.

³² L. Charles Murrin, *Heroin*, in *xPharm: The Comprehensive Pharmacology Reference 1* (S.J. Enna & David B. Bylund eds., 2008), <https://doi.org/10.1016/B978-008055232-3.63891-7>.

³³ DEA Museum, *Opium Poppy*, <https://museum.dea.gov/exhibits/online-exhibits/cannabis-coca-and-poppy-natures-addictive-plants/opium-poppy> (last visited Sept. 19, 2025).

United States of America (U.S.) imposed a complete federal ban on its production and import in 1924.

d. Cocaine

Cocaine, a tropane alkaloid naturally extracted from the leaves of the coca plant, is a central nervous system stimulant that produces rapid onset effects and induces intense euphoria.³⁴ When inhaled or injected, high doses can precipitate severe psychological effects, including formication (the sensation of insects crawling on the skin). Excessive inhalation can lead to rapid pulse, irregular breathing/respiration, fever, and seizures, with severe cases resulting in death from respiratory failure.

Historically, in the ancient Inca Empire, priests leveraged its hypnotic effects during religious ceremonies, while commoners utilized it to alleviate hunger and fatigue.³⁵ Coca leaves were introduced to Europe around 1532, concurrent with the Spanish invasion of the Inca Empire. The cocaine alkaloid was chemically isolated in the mid-1800s and first used as a medical analgesic in 1873.

Coca plants thrive in the highlands of the Andes Mountains across **Bolivia, Peru, and Colombia**. When coca leaves are chewed, the alkaloids in the leaves are absorbed through the oral mucosa, stimulating the central nervous system's nerve endings, and inducing a feeling of pleasure.

In South America, farmers often process coca leaves into a paste, called 'coca paste,' which is refined into cocaine.³⁶ While direct consumption of coca leaves or smoking of coca paste occurs, the majority of abusers snort the crystalline powder or inject it with a syringe. Significantly, the bulk of cocaine extraction and refinement is conducted secretly in decentralized manufacturing facilities. Conversely, in the U.S., pharmaceutical-grade cocaine is officially produced under strict legal regulations for its legitimate use as a local anesthetic.

'Crack cocaine' or cocaine freebase, is an insoluble substance in water, thus requires heating for the resulting smoke to be inhaled. Its name comes from the distinct 'cracking' sound the solids emit during heating. When smoked, the rapid surge in cerebral dopamine secretion elicits intense feelings of confidence and elation. However, this potent effect is transient, typically lasting only 5 to 10 minutes, which mandates continuous consumption to sustain the experience. Despite its effects being several times more intense and addictive than powder cocaine, its comparatively lower cost compared to powder cocaine has led to its widespread use throughout the **U.S.**

³⁴ Eur. Union Drugs Agency, *Cocaine and Crack Drug Profile*, https://www.euda.europa.eu/sites/default/files/pdf/31491_en.pdf?335968ok (last visited Sept. 19, 2025).

³⁵ Rita Roque Bravo et al., *Cocaine: An Updated Overview on Chemistry, Detection, Biokinetics, and Pharmacotoxicological Aspects including Abuse Pattern*, 14 *Toxins* 278 (2022), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9032145/>.

³⁶ Eur. Union Drugs Agency, *supra* note 29.

iii. Synthetic narcotics

Synthetic narcotics were initially developed in an effort to synthesize analgesic agents structurally distinct from morphine, yet possessing comparable therapeutic effects but with less dependency liability.³⁷ However, these compounds inherently carry their own potential for dependence and adverse side effects. They are primarily classified by their chemical structure, with the pethidine-based or phenylpiperidines, and methadone-based or diphenylheptylamine classes representing the most widely abused synthetic narcotics.³⁸

a. Pethidine-based/phenylpiperidines drugs

Pethidine or meperidine, while chemically different from morphine, is a synthetic narcotic designed to act on the central nervous system to yield an analgesic effect similar to that of morphine.³⁹ In addition to its pain-relieving properties, it possesses a sedative effect.

Pethidine was first synthesized in 1939 by **O. Eisleb** of the German pharmaceutical company **Hoechst**. It was initially marketed under the brand name ‘Dolantin’ and later distributed under trade names, such as ‘Demerol’ and ‘Pethadel.’ Other drugs in this class include fentanyl and diphenoxylate.

1) Fentanyl

Fentanyl, a phenylpiperidines-class opioid, is a synthetic narcotic utilized for the management of severe pain in terminal cancer patients, those with complex regional pain syndrome, and patients undergoing major surgery.⁴⁰ Due to its extreme toxicity, even a minuscule dose is often fatal to the human body.

Opioid misuse and abuse, primarily involving fentanyl, is currently the leading cause of death for Americans under 50, with an estimated 75,000 death from fentanyl poisoning in 2022 alone. The fentanyl being illegally misused in the U.S. is largely manufactured by Mexican cartels without **Food and Drug Administration (FDA)** approval and is sold in pill and powder forms without precise dosage, ensuring a powerful and often lethal effect.

³⁷ Paul B. Weill & Ulrich Weiss, *The Structure of Morphine*, 2 U.N. Office on Drugs & Crime Bull. on Narcotics 12 (1951), https://www.unodc.org/unodc/en/data-and-analysis/bulletin/bulletin_1951-01-01_2_page006.html.

³⁸ David S. Wishart et al., DrugBank: a knowledgebase for drugs, drug actions and drug targets, 36 Nucleic Acids Res. D901 (2008), <https://www.ncbi.nlm.nih.gov/pubmed/18048412>.

³⁹ P. O. Wolff, *On pethidine and methadone derivatives*, 2 Bull. World Health Org. 193 (1949), <https://apps.who.int/iris/bitstream/handle/10665/266102/PMC2553950.pdf?sequence=1>.

⁴⁰ Wishart, supra note 33.

2) Diphenoxylate

Diphenoxylate was discovered in 1956 by **Paul Janssen** at **Janssen Pharmaceutica**.⁴¹ Initially formulated as an opioid derivative, its potent peripheral gut activity led to its application as an antidiarrheal, and it remains a prescription-only treatment globally. At therapeutic dosages, it reduces intestinal motility; however, at high concentrations, it induces opioid-like sedation and euphoria. Chronic misuse carries the risk of physical dependence and withdrawal analogous to those of mild morphine withdrawal.

b. Methadone-based / diphenylheptylamine drugs

Methadone, a synthetic narcotic of the diphenylheptylamine class, is chemically distinct from morphine and heroin.⁴² It was developed by the German pharmaceutical **company Farbwerke Hoechst** and was internally identified as ‘Hoechst 10820’ or ‘Polamidon.’ Although it was available during the Second World War (WWII), it was not used due to insufficient research on its pharmacological effects. It shares many pharmacological effects with morphine and heroin, but its significantly longer half-life made it valuable for opioid replacement therapy following WWII, particularly when morphine supplies were scarce.

Currently, methadone is primarily utilized worldwide for the management of severe chronic pain as a medication-assisted treatment for Opioid Use Disorder (OUD) within methadone maintenance programs. This treatment aids in cessation from illicit opioids such as heroin. Physically, methadone acts as an analgesic and effectively mitigates withdrawal symptoms and craving associated with opioid dependency.⁴³ Mentally, it provides mood stabilization for OUD patients, though high doses can induce drowsiness, euphoria or, in some cases, mental clouding.

Methadone, available in forms such as white powder, liquid solution, or orange tablets, is addictive, like all opioids. However, its prolonged half-life helps prevent the sharp ‘highs and lows’ characteristic of short-acting opioids, thereby reducing the likelihood of cyclical craving and withdrawal, though physical dependency can still develop with long-term use. Other compounds in this class include acetylmethadol and dipipanone.⁴⁴

1) Acetylmethadol

Acetylmethadol, specifically levo-alpha-acetylmethadol (LAAM), was developed as a synthetic opioid after methadone. It was approved by the U.S. **FDA** for clinical use in 1993 for

⁴¹ Klaus Florey, Profiles of Drug Substances, Excipients and Related Methodology 342 (1991).

⁴² Norman G. Bowery, *Methadone*, in *xPharm: The Comprehensive Pharmacology Reference 1* (S.J. Enna & David B. Bylund eds., 2007), <https://doi.org/10.1016/B978-008055232-3.62142-7>.

⁴³ Zoltán M. Barta et al., *Adherence to Oral Oncology Treatment in Clinical Practice*, 27 *The Oncologist* 323 (2022).

⁴⁴ National Academies of Sciences, Engineering, and Medicine, *Methadone Treatment for Opioid Use Disorder: Improving Access Through Regulatory and Legal Change: Proceedings of a Workshop* (Caroline Stroud et al. eds., 2022), <https://www.ncbi.nlm.nih.gov/books/NBK585210/>.

opioid addiction treatment under the brand name ‘Orlaam.’ Its long duration of action presented an advantage over methadone by allowing for thrice-weekly dosing instead of daily administration.⁴⁵ However, it was subsequently withdrawn from European markets in 2001 and discontinued by its leading U.S. producer in 2003 due to its confirmed association with rare but dangerous cardiac arrhythmias (rhythm disturbances).

In its pure form as a white crystalline solid, acetylmethadol produces physical effects similar to other opioids, including analgesia (pain relief), euphoria, and sedation.⁴⁶ Mentally, it is effective at suppressing opioid withdrawal over extended periods, potentially reducing cravings with less sedation than methadone for some users. Misuse carries a significant risk for dependence and addiction. While overdose symptoms, such as respiratory depression, unconsciousness, and death, are typical of opioids, its slow onset and long duration may reduce the ‘rush’ associated with drugs like heroin.⁴⁷

2) Dipipanone

Dipipanone was developed and introduced in the **United Kingdom (UK)** in the early 1950s as a potent opioid analgesic for the management of severe pain, particularly when alternatives like morphine were contraindicated due to patient intolerance or allergy.⁴⁸ It was prescribed under the brand names of ‘Pipadone’ and ‘Diconal.’ Misuse of injectable dipipanone-cyclizine formulations in the **UK** during the late 1970s and early 1980s led to numerous fatalities, including complications such as limb amputations caused by insoluble tablet binders. Consequently, it is now rarely utilized globally due to the availability of newer, safer opioid alternatives.

As a potent opioid, dipipanone, available as a white tablet or pure white crystalline powder, induces potent analgesia, sedation, euphoria. High doses, notably when injected, can cause drowsiness, nausea, and confusion. Its combination with cyclizine is notably associated with producing an intense ‘rush.’⁴⁹ Like other opioids, it is highly addictive and carries a significant risk for tolerance, dependence, abuse, and death via severe respiratory depression.

⁴⁵ M.L. Prendergast et al., *Levo-alpha-acetylmethadol (LAAM): Clinical, Research, and Policy Issues of a New Pharmacotherapy for Opioid Addiction*, 27 Rev. J. Psychoactive Drugs 239 (1995).

⁴⁶ DrugBank, *Levo-alpha-acetylmethadol* (DB01227) (last modified Sept. 21, 2023), <https://go.drugbank.com/drugs/DB01227>.

⁴⁷ Paul J. Fudala, *LAAM—Pharmacology and Pharmacokinetics, Developmental History, and Therapeutic Considerations*, 17 J. Psychoactive Drugs 233 (1996).

⁴⁸ PubChem, *Dipipanone* (Compound ID: 1770), National Center for Biotechnology Information, <https://pubchem.ncbi.nlm.nih.gov/compound/Dipipanone>.

⁴⁹ Synapse Patsnap, *What Is Dipipanone Hydrochloride Used For* (last visited Oct. 15, 2025), <https://synapse.patsnap.com/article/what-is-dipipanone-hydrochloride-used-for>.

B. Psychotropic substances

Psychotropic substances constitute substances that affect mental functions and behavior, differentiating them from ‘narcotic drugs’ by encompassing a wide array of synthetic and semi-synthetic compounds from stimulants to hallucinogens.

i. Category (a)

As shown in Table 1, category (a) has *high* potential for misuse or abuse, is *not* currently *accepted* for medical use in treatment, and may lead to *severe* physical or psychological dependence.

a. Methamphetamine

Amphetamines, including methamphetamine, are potent central nervous system stimulants that engender profound psychological dependency.⁵⁰ Methamphetamine was first synthesized in 1893 by Professor Nagai Nagayoshi of the Faculty of Medicine at Tokyo Imperial University in Japan, after his 1888 work on extracting ephedrine from the asthma treatment herb *Ephedra*.⁵¹ The Japanese pharmaceutical company, Dainippon Pharmaceutical Co., later released it under the brand name ‘Hiroppon,’ whose English product name ‘Philopon’ was derived from the Greek work ‘philoponos,’ meaning ‘loving work.’ It was sold commercially as a stimulant to combat sleepiness and fatigue.

Methamphetamine was patented by the German pharmaceutical company, **Temmler Werke GmbH**, and marketed under the product name ‘Pervitin’ as a home remedy for various ailments in 1937.⁵² It was quickly mass-produced as a military supply during WWII, and used to improve fatigue recovery, combat morale, work efficiency, and production capacity for soldiers, factory workers, students, and depressed housewives. By 1941, due to increasing consumer complaints regarding adverse side effects, its distribution was restricted to a prescription-only status.

Methamphetamine, the most widely abused stimulant in **South Korea**, is commonly known as ‘Philopon,’ ‘Hiroppon,’ ‘white temptation,’ and ‘white powder.’⁵³ It exists in various forms, including crystals, powder, and liquid, which gives rise to a broad range of illegal slang

⁵⁰ Nam ji Kwon & Eunyong Han, *A commentary on the effects of methamphetamine and the status of methamphetamine abuse among youths in South Korea, Japan, and China*, 286 *Forensic Sci. Int'l* 81 (2018), <https://doi.org/10.1016/j.forsciint.2018.02.022>.

⁵¹ United Nations Office on Drugs and Crime, *2012 Patterns and Trends of Amphetamine-Type Stimulants and Other Drugs, Asia and the Pacific* (2012), https://www.unodc.org/roseap/uploads/archive/documents/2012/12/ats-2012/2012_Regional_ATS_Report_FINAL_HQPDF_3_Dec_2012_low.pdf.

⁵² Deutschlandmuseum, *Stimulant Pervitin*, Deutschlandmuseum (2023), <https://www.deutschlandmuseum.de/en/collection/stimulant-pervitin/>.

⁵³ Ling-Yi Feng et al., *Comparison of illegal drug use pattern in Taiwan and Korea from 2006 to 2014*, 11 *Harm Reduction J.* 42 (2016), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5034652/>.

terms, such as ‘ppong,’ ‘garu’ meaning powder, ‘sool’ meaning alcohol, ‘crystal,’ ‘mool-geon’ meaning a thing, and ‘chong’ meaning a gun. In the **U.S.** and **Australia**, the crystalline form is often called ‘ice,’ while the powder form is known by names such as ‘speed,’ ‘tweak,’ ‘go-fast,’ ‘crank,’ ‘rocket fuel,’ and ‘tina.’⁵⁴ Its regional aliases further include ‘bingdu’ or ‘bindu’ in **China**, and ‘kakuseizai’ in Japan, ‘shabu’ in the **Philippines**, ‘yaba’ or ‘yama chakk’ in **Cambodia**, ‘amitamin’ in Taiwan, ‘myin say’ in **Myanmar** and ‘P’ in **New Zealand**.

b. Methylendioxyamphetamine (MDMA)

MDMA, short for methylenedioxyamphetamine, was first developed in 1914 by the chemist Dr. Anton Köllisch, working for Merck, a German pharmaceutical company.⁵⁵ While it was later banned from the market, it was covertly reintroduced as a psychoactive drug in the 1980s and is now widely abused globally due to its potent psychoactive and hallucinogenic properties.

MDMA is also known by numerous street names, including ‘ecstasy,’ ‘XTC,’ ‘adam,’ ‘eve,’ ‘clarity,’ ‘decadence,’ and ‘M&M.’⁵⁶ In **South Korea**, it is commonly referred to as ‘ek-seu-teo-si’ or ‘doridori,’ which refers to the involuntary head or body movements associated with the drug’s effects. Its tendency to enhance feelings of empathy and closeness has also earned it the street name ‘hug drug.’

MDMA causes a dramatic sense of euphoria, often accompanied by side effects, such as dry mouth and dilated pupils. An overdose can lead to acute symptoms, including anxiety, restlessness, visual and auditory hallucinations, vomiting, and increased blood pressure. In severe cases, overdose can result in death from cardiac arrest.

Although MDMA is generally cheaper than methamphetamine, its hallucinogenic effect is about 3 times stronger.⁵⁷ It is primarily consumed in pill form, and its ease of use has facilitated its widespread misuse and abuse across many countries.

c. Lysergic acid diethylamide (LSD)

LSD, commonly known as acid, is a tasteless, odorless, colorless hallucinogen, first synthesized in 1938 by Swiss chemist Albert Hofmann, inspired by ergot fungus that grows on

⁵⁴ United Nations Office on Drugs and Crime, *supra* note 38.

⁵⁵ *EU Drug Markets: MDMA — Introduction*, Eur. Union Drugs Agency, https://www.euda.europa.eu/publications/eu-drug-markets/mdma/introduction_en (last visited Dec. 4, 2025).

⁵⁶ United Nations Office on Drugs and Crime, *Street Names of Ecstasy-Country Specific* (2007), https://www.unodc.org/pdf/india/g86/street_names_xtc_230707.pdf.

⁵⁷ Ling-Yi Feng et al., *Comparison of illegal drug use pattern in Taiwan and Korea from 2006 to 2014*, 11 *Harm Reduction J.* 42 (2016), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5034652/>.

rye.⁵⁸ Its inexpensive nature facilitated its rapid diffusion among young people and adolescents during the 1960s counterculture movement.⁵⁹

LSD is generally administered by absorbing its solutions onto a paper (blotter paper) or tablets.⁶⁰ It is typically consumed via sublingual absorption of a solution placed on a small sheet of paper, known as a ‘blotter paper,’ or in microdot pill form. The substance is potent, with very oral doses being sufficient to elicit profound effects.⁶¹ Users experience a hallucinogenic state that profoundly distorts the five senses. Adverse psychological reactions, characterized by intense fear, anxiety, panic, and dread, are possible, which can potentially lead to criminal or self-harming behaviour.⁶² Side effects such as brain damage, increased blood pressure, and tremors have been reported in several rare cases.

d. Kratom

Kratom or ‘biak-biak,’ is a tropical tree native to Southeast Asian regions, including **Thailand** and **Malaysia**, that can grow up to 15 meters in height.⁶³ Historically, people in these regions have used its leaves as a stimulant to endure hard physical labour or as an alternative to ease opioid withdrawal symptoms.⁶⁴ The substance is consumed by chewing leaves, drinking it as a tea, or mixing the powder form with a beverage.⁶⁵ When taken in low doses, it produces an arousing effect that increases talkativeness and sociability. Conversely, a large dose can cause a sedative and euphoric effect, accompanied by side effects such as vomiting and dizziness.

e. Tryptamines

Tryptamines are a class of psychoactive compounds, including the hallucinogens psilocybin (in ‘Magic mushrooms’) and dimethyltryptamine (DMT, in Ayahuasca brews) that have

⁵⁸ Norman Miller, *Basel: The Birthplace of Hallucinogenic Science*, BBC Travel (July 13, 2020), <https://www.bbc.com/travel/article/20200713-basel-the-birthplace-of-hallucinogenic-science>.

⁵⁹ Erik Davis on *LSD, the psychedelic underground and visionary experience*, *To The Best of Our Knowledge* (TTBOOK), July 22, 2024, <https://www.ttbook.org/show/erik-davis-lsd-psychedelic-underground-and-visionary-experience>.

⁶⁰ Miller, *supra* note 43.

⁶¹ C.H. Murray et al., *Neural complexity is increased after low doses of LSD, but not moderate to high doses of oral THC or methamphetamine*, 49 *Neuropsychopharmacology* 1120 (2024), <https://pmc.ncbi.nlm.nih.gov/articles/PMC11109226/>.

⁶² *LSD*, Molecule of the Week, American Chemical Society, May 5, 2014. <https://www.acs.org/molecule-of-the-week/archive/l/lsd.html>.

⁶³ Hamouchene, H. (2021, October 14). *Kratom in Myanmar and southeast Asia: time for legal regulation?*. Transnational Institute. <https://www.tni.org/en/article/kratom-in-myanmar-and-southeast-asia-time-for-legal-regulation>.

⁶⁴ Singh, D., et al., *Changing trends in the use of kratom (Mitragnyna speciosa) in Southeast Asia*. *Human Psychopharmacology: Clinical and Experimental*, 32(3) (2017). DOI: 10.1002/hup.2582.

⁶⁵ Sayamol Charoenratana, et al., *Attitudes towards Kratom use, decriminalization and the development of a community-based Kratom control mechanism in Southern Thailand*, *Int'l J. Drug Pol'y*, 95, 103197 (2021). DOI: 10.1016/j.drugpo.2021.103197.

been used for centuries in shamanic and spiritual rituals across Central and South America,⁶⁶ natural tryptamines are found in dried mushrooms, crystals, or plant brews, while synthetic versions are usually white crystalline or off-white powders prepared in capsule or tablet form for oral use. DMT was first synthesized in 1931 by **Richard Manske** and characterized in nature in 1946 by **Oswaldo Goncalves** de Lima from the root bark of *mimosa hostillis*, a small tree, sometimes thorny, that can grow up to 8 meters tall.⁶⁷

As classic hallucinogens, tryptamines produce vivid visual and auditory alterations, profound changes in thought and emotion, and can induce mystical or spiritual experiences. Consequently, they are often subjects of psychedelic research and may be legal in countries like **Brazil** or **Peru** for ayahuasca religious rites.⁶⁸ Physically, their effects are usually mild, manifesting as dilated pupils, increased heart rate, and nausea. However, high doses can provoke confusion, dissociation, panic, or psychotic breaks. Experienced users frequently report an enhanced sense of connectedness, synesthesia, and altered perceptions of time and identity. Negative experiences/bad trips can feature intense anxiety, paranoia, or depersonalization. While most tryptamines are not generally deemed physically addictive and do not produce classic withdrawal syndromes, repeated or high-dose use in susceptible individuals may trigger persistent psychological problems.

f. **Methylenedioxypropylamphetamine (MDPV)**

MDPV, also known as ‘monkey dust’, was first synthesized in the 1960s by the German pharmaceutical company Boehringer Ingelheim.⁶⁹ Initially patented in 1969 as a central stimulant, it remained obscure for almost 40 years before emerging on the illicit market during the mid-2000s, often marketed as “bath salts.”⁷⁰ Law enforcement detection began in **Germany** around 2007, leading to bans in the **U.S.** and **Australia** in the early 2010s.

MDPV, a white or yellowish powder, is a powerful stimulant that mimics the effects of cocaine or amphetamines, and is often illicitly sold as a ‘legal’ alternative or analogue to highly regulated drugs.⁷¹ Users report intense euphoria, rapid heart rate, increased blood pressure, mental and physical stimulation, and heightened feelings of sociability and sexual arousal. Crucially, its mechanism involves disrupting normal dopamine recycling, resulting in pronounced anhedonia

⁶⁶ R. Tittarelli et al., *Recreational Use, Analysis and Toxicity of Tryptamines*, 13 *Curr. Neuropharmacol.* 26 (2015).

⁶⁷ Hunter W. Korsmo, *Exploring Endogenous Tryptamines: Overlooked Agents Against Fibrosis in Chronic Disease? A Narrative Review*, 4 *Livers* 615 (2024).

⁶⁸ Ana Margarida Araújo et al., *The Hallucinogenic World of Tryptamines: An Updated Review*, 89 *Arch. Toxicol.* 1151 (2015).

⁶⁹ *Methylenedioxypropylamphetamine*, ScienceDirect,

<https://www.sciencedirect.com/topics/neuroscience/methylenedioxypropylamphetamine> (last visited Nov. 12, 2025).

⁷⁰ Renata Kolanos et al., “Deconstruction” of the Abused Synthetic Cathinone Methylenedioxypropylamphetamine (MDPV) and an Examination of Effects at the Human Dopamine Transporter, 4 *ACS Chem. Neurosci.* 1524 (2013).

⁷¹ European Monitoring Centre for Drugs and Drug Addiction & Europol, *EMCDDA–Europol Joint Report on a New Psychoactive Substance: MDPV (3,4-methylenedioxypropylamphetamine)*, Joint Reports (Publications Office of the European Union 2014).

(inability to feel pleasure) and potentially weeks-long psychiatric symptoms after the effects wear off.

Higher doses dramatically increase the risk for paranoia, delusions, psychosis, aggression, mood swings, and even suicidal ideation, often leading users to suffer a psychotic break or develop severe delirium. Neuroscientific studies show disruption of brain connectivity associated with negative cognitive, sensory, and emotional states, underscoring why MDPV intoxication can resemble acute psychosis. Severe medical emergencies, including heart attacks, strokes, kidney failure, and seizures, result directly from MDPV consumption.

MDPV, due to its exceptionally high risk of both physical and psychological addiction liability, precipitates a range of severe adverse health outcomes, from withdrawal syndromes characterized by depression, anxiety, lethargy, panic attacks, aggression, and psychotic episodes, to life-threatening clinical conditions such as acute psychosis, rhabdomyolysis (muscle breakdown), myocardial infarction (heart attack), and strokes.⁷² Its high-potency mechanism as a dopamine and norepinephrine reuptake inhibitor places it alongside powerful stimulants like methamphetamine and cocaine regarding addiction liability. The rapid development of tolerance and intense cravings prompt users to escalate doses quickly, reinforcing addictive behavior. Media coverage, particularly in places like Australia, reinforced its reputation for potency by highlighting violent outbreaks and erratic behavior among users, including “zombie-like” self-harm or attacks.⁷³ Attempts to stave off withdrawal by repeated use can trigger cycles of escalating consumption, reinforcing addictive behavior, and contributing to long-term psychiatric and physiological harm.⁷⁴

ii. Category (b)

As shown in Table 1, category (b) has *high* potential for misuse or abuse, *very limited* medical use in treatment, and may lead to *severe* physical or psychological dependence.

a. Ketamine hydrochloride (Ketamine)

Ketamine, an anesthetic used in both human and veterinary medicine, carries the potential to induce physical and psychological dependence, as well as withdrawal symptoms, when its use is subject to misuse or abuse.⁷⁵ In entertainment venues and clubs, it is referred to as a ‘date-rape drug’ due to its dissociative, incapacitating effects. When injected intravenously, intramuscularly, smoked or inhaled, it produces a powerful hallucinatory effect, making the user feel as if they are

⁷² Laguna Treatment Hosp., *MDPV Abuse and Addiction*, <https://lagunatreatment.com/drug-abuse/mdpv/> (last visited Nov. 12, 2025).

⁷³ Naren Gunja, *Weekly Dose: New drug MDPV, or ‘monkey dust’, found in Australia – what is it and what are the harms?*, *The Conversation* (Jan. 3, 2019), <https://theconversation.com/weekly-dose-new-drug-mdpv-or-monkey-dust-found-in-australia-what-is-it-and-what-are-the-harms-109505>.

⁷⁴ Blake A. Froberg et al., *Acute Methylenedioxypropylvalerone Toxicity*, 11 *J. Med. Toxicol.* 185 (2014).

⁷⁵ Rosenbaum, Steven B., et al., *Ketamine*, in *StatPearls* [Internet] (StatPearls Publishing, Jan. 2025) (last updated Jan. 30, 2024), <https://www.ncbi.nlm.nih.gov/books/NBK470357/>.

leaving their body. Various slang terms categorize the spectrum of this out-of-body experience: 'K-land' denotes a mild, colorful trip; 'K-hole' signifies the intense, near-death sensation of dissociation; 'baby food' refers to a feeling of pleasant, infant-like stillness; and 'god' is a term used by users who believe they have contacted their creator.⁷⁶ It can cause side effects, such as an increased heart rate, high blood pressure, respiratory distress, and cardiac arrest.

b. Yaba

Yaba, meaning 'crazy medicine' in Thai, is a psychotropic substance manufactured in tablets by mixing various hallucinogenic components, such as 30% of methamphetamine, 60% of caffeine, and 10% of codeine.⁷⁷ Starting in the 1970s, this manufacturing method for Yaba became known in Thailand. It is also known by several names, including 'nazi speed,' 'kamikaze,' 'biker's coffee,' 'madness drug,' and 'shabu.'⁷⁸

Yaba tablets are brightly colored, often red, pink, or orange, and are sold as pills or capsules, making it easy to disguise them as a pharmaceutical drug.⁷⁹ Ingestion of Yaba use quickly causes a stimulant 'rush' with increased heart rate, high blood pressure, and risks of neurotoxicity. It also causes dehydration, appetite suppression, euphoria, excitement, aggression, and depressive episodes. Taking large amounts for several days is associated with stimulant psychosis, paranoia, hallucinations, and long-term psychiatric harm.

c. Benzylpiperazine (BZP)

BZP, short for benzylpiperazine, was first synthesized by **Burroughs Wellcome** in 1944, initially as a potential anti-parasitic agent for use in animals.⁸⁰ Due to adverse effects, it was abandoned but, by the 1970s, BZP surfaced as a possible antidepressant but was rejected because it caused amphetamine-like stimulation and abuse risk. In the 1990s, BZP's reputation as a recreational drug first arose in California and then globally among party scenes and as an adulterant in illicit drugs like MDMA/ecstasy.⁸¹ Its use exploded in **New Zealand**, where it was sold legally in convenience stores and head shops until it was banned in 2008. Other countries followed by reclassifying BZP as a controlled substance.

⁷⁶ U.S. Drug Enf't Admin., *Ketamine* (2020), <https://www.dea.gov/sites/default/files/2020-06/Ketamine-2020.pdf>.

⁷⁷ Janes, Joseph, *Yaba's grip: how cheap methamphetamine is fuelling Thailand's addiction crisis*, *The Conversation: Academic rigour, journalistic flair* (Sept. 1, 2025, 12:28 PM BST), <https://theconversation.com/yabas-grip-how-cheap-methamphetamine-is-fuelling-thailands-addiction-crisis-262765>.

⁷⁸ United Nations Office on Drugs and Crime, *Yaba, the 'Crazy Medicine' of East Asia*, U.N. Office on Drugs & Crime (May 19, 2008), <https://www.unodc.org/unodc/en/frontpage/yaba-the-crazy-medicine-of-east-asia.html>.

⁷⁹ Linda Pressly, *Yaba: The cheap synthetic drug convulsing a nation*, *BBC News* (Apr. 25, 2019), <https://www.bbc.com/news/stories-48041414>.

⁸⁰ J. R. Kerr & L. S. Davis, *Benzylpiperazine in New Zealand: Brief History and Current Implications*, 41 *J. Royal Soc'y N.Z.* 155 (2011).

⁸¹ U.S. Drug Enf't Admin., *N-Benzylpiperazine (BZP)* (2025), https://www.deadiversion.usdoj.gov/drug_chem_info/bzp.pdf.

BZP is a white, crystalline powder that can be pressed into tablets, filled into capsules, or mixed into drinks. It acts as a stimulant similar in effect to amphetamine or MDMA, though generally less euphoric and less potent.⁸² Users report increased energy, sociability, talkativeness, and mood enhancement. Physically, BZP can elevate blood pressure, produce sweating and tremors, and, in higher doses, induce seizures or dangerous hyperthermia. Side effects can include headache, nausea, anxiety, insomnia, rapid heartbeat, and agitation. Prolonged use may cause paranoia, confusion, or hallucinations, especially when combined with other substances. Some users experience “comedown” effects mirroring those of amphetamine withdrawal. BZP can be habit-forming but is less addictive than methamphetamine.

d. *Salvia divinorum* (salvia)

Salvia divinorum or salvia, a psychoactive sage native to the Mazatec regions of Oaxaca, Mexico, has been used by indigenous shamans for hundreds of years as a visionary herb believed to communicate with divine or spiritual entities.⁸³ An American ethnographer, **R. Gordon Wasson**, formally documented its ritual use in the 1950s. Western pharmacological research began in the 1990s, leading to the isolation of salvinorin A, the compound responsible for its extraordinary hallucinogenic potency. *Salvia* remains legal in only a few countries, often restricted to botanical or religious contexts. Today, it is still used ceremonially by Mazatec healers and studied pharmacologically for its potential insights into consciousness and mood regulation.

Salvia, usually smoked or chewed, induces vivid hallucinations, distortions in perception and time, and profound dissociation.⁸⁴ Users often describe becoming objects, perceiving multiple realities, or encountering imagined entities. Physically, it can cause dizziness, nausea, and loss of coordination. Though its duration is brief, psychological intensity is extreme, with lingering derealization possible in sensitive users. Consequently, *Salvia* has earned the following street names: ‘magic mint,’ ‘maria pastora,’ which translates to ‘Mary the Shepherdess,’ ‘Sally-D,’ ‘shepherdess’s herb,’ and ‘diviner’s sage.’⁸⁵ Even though it is not addictive in the traditional sense, lacking a recognizable withdrawal pattern, psychological distress, confusion, and flashback-type symptoms have indeed been reported following repeated use.

⁸² Eur. Union Drugs Agency, *BZP/piperazines Drug Profile*, https://www.euda.europa.eu/publications/drug-profiles/bzp_en (last visited Nov. 7, 2025).

⁸³ TN Scientific, *Exploring the World of Salvia: History, Uses, and Effects* (2025), <https://www.tnscientific.com/post/exploring-the-world-of-salvia-history-uses-and-effects>.

⁸⁴ *Id.*

⁸⁵ Eric Patterson, *List of Street Names for Drugs*, DrugAbuse.com (July 30, 2025), <https://drugabuse.com/addiction/list-street-names-drugs/>.

e. Phencyclidine-type substances (PCP)

PCP, short for phencyclidine-type substances, was synthesized in 1926 and first used medically in the 1950s as surgical anesthesia under the name ‘Sernyl.’⁸⁶ By 1965, side effects like hallucinations, agitation, and psychosis ended its human use. PCP transitioned to veterinary use but was soon diverted for recreational use in the 1960s San Francisco psychedelic scene, known for being central to the hippie movement.

PCP, which comes as a white powder, tablets, or liquid solutions used for smoking or injection, produces euphoria, anesthesia, psychic detachment, and hallucinations, but can cause extreme agitation and violence. Addiction risk is moderate to high due to both psychological reinforcement and tolerance. Straight PCP is known as: ‘angel dust,’ ‘amoeba,’ ‘amp,’ ‘animal trunk,’ ‘belladonna,’ ‘peace pills,’ ‘rocket fuel,’ and ‘embalming fluid.’⁸⁷ PCP combined with marijuana or tobacco cigarettes is known as: ‘wet,’ ‘killer joint,’ ‘crystal supergrass,’ and ‘fry.’ PCP combined with MDMA is called: ‘elephant flipping’ and ‘pikachu.’

iii. Category (c)

As shown in Table 1, category (c) has high potential for misuse or abuse, is not currently accepted for medical use in treatment, and may lead to severe physical or psychological dependence.

a. Diethyl-barbituric acid (barbital)

Diethyl-barbituric acid, also known as barbital, malonal, or gardenal, is a class of barbiturates, central nervous system depressants derived from barbituric acid.⁸⁸ Barbital was synthesized by treating the argentic salt of barbituric acid with ethyl iodide. It was introduced clinically as a hypnotic for sleep induction by the German companies E. Merck and F Bayer and Co (formerly Elberfeld) in 1904. It was marketed by **F. Bayer & Co.** under the name ‘Veronal.’ Major overdose epidemics occurred in the 1930s–1950s as barbiturates, including barbital, were widely prescribed for insomnia, leading to many accidental and intentional deaths worldwide.

Barbituric acid, as a white, odorless, crystalline powder or as scored tablets, sometimes cocoa flavored, depresses the central nervous system, inducing hypnosis/profound sleep, sedation, and sometimes euphoria or anxiolysis.⁸⁹ It can cause impaired motor coordination, cognitive slowing, and at higher doses, severe respiratory and cardiovascular depression. Barbiturates have a high

⁸⁶ Janet Ober Berman, *PCP*, Research Starters, EBSCO (2024), <https://www.ebsco.com/research-starters/health-and-medicine/pcp>.

⁸⁷ Amanda Lautieri, *PCP Facts, History, and Statistics*, DrugAbuse.com (July 30, 2025), <https://drugabuse.com/drugs/hallucinogens/pcp/history-statistics/>.

⁸⁸ Francisco López-Muñoz et al., *The History of Barbiturates a Century After Their Clinical Introduction*, 1 *Neuropsychiatr. Dis. Treat.* 329 (2005).

⁸⁹ *Id.*

risk of addiction and tolerance development.⁹⁰ Overdose produces profound sedation, coma, and risk of fatal respiratory depression. Even at therapeutic doses, risks include cognitive/motor impairment and next-day drowsiness. Prolonged use leads to psychological and physical dependence, with potentially severe withdrawal symptoms such as seizures, anxiety, and delirium.

b. Lysergic Acid Amide (LSA)

LSA, short for Lysergic Acid Amide, also known as LA-111 or Ergine, was first isolated from ergot fungus in 1932 by British chemists **Sidney Smith** and **Geoffrey Timmis**.⁹¹ Later, famed chemist Albert Hofmann isolated and identified LSA as a key psychoactive component in the seeds of morning glory, *Ipomoea tricolor*, and discovered its psychoactive, hallucinogenic use among Mesoamerican peoples. Morning glory seeds, containing LSA, have been used for centuries by Mazatec and Zapotec shamans in spiritual and healing ceremonies, well before Western scientific documentation in the early 20th century. In the 1960s, the **Central Intelligence Agency** of the U.S. conducted research on *ololiuhqui* and *Rivea corymbosa* seeds, both natural LSA sources, for their potential in mind control and interrogation in the MKULTRA project.⁹²

LSA, known as ‘Heavenly Blue,’ ‘Pearly Gates’ and ‘Wedding Bells,’ induces visual distortions, euphoria, dream-like states, altered sensory perception, and can provoke anxiety, confusion, paranoia, or even psychosis, especially at high doses. Physically, it can cause nausea, vomiting, dizziness, dilated pupils, increased blood pressure, tremors, and drowsiness.⁹³ It is typically consumed from the seeds of morning glory, Hawaiian baby wood rose, or similar species, which look like brownish-black, hard seeds. Several hospitalizations and emergency room cases worldwide stem from excessive ingestion of LSA-containing seeds, which often result in severe nausea, vasoconstriction, mental confusion, and rare cases of psychotic breaks.

c. Flunitrazepam

Flunitrazepam, a member of the benzodiazepine class of drugs, was created in the 1960s by the Swiss pharmaceutical company **Hoffmann-La Roche Ltd**.⁹⁴ It was marketed in Switzerland during the 1970s to treat insomnia and function as a preoperative anesthetic to mitigate surgical pain. Its availability subsequently expanded across Europe, Asia, and Latin America under the trade name ‘Rohypnol.’ Due to its high potential for abuse and dangerous side effects as a club drug, its manufacture and distribution in the **U.S** and **Canada** is completely banned.

⁹⁰ Britannica, *Barbital*, Encyclopædia Britannica, <https://www.britannica.com/science/barbital>.

⁹¹ Paula S.C.C. Castro et al., *Lysergic Acid Amide (LSA), an LSD Analog: Systematic Review of Pharmacological Effects, Adverse Outcomes, and Therapeutic Potentials*, 13 *Pharmacy* 98 (2025).

⁹² Cent. Intelligence Agency, FOIA, *Project MKULTRA, Subproject 22 (w/Attachments)* (Nov. 3, 1956), <https://www.cia.gov/readingroom/document/0000707674>.

⁹³ Camille Ponté & Maryse Lapeyre-Mestre, [*Psychoactive effects of 'legal high': About lysergic acid amide (LSA)*] [*Psychoactive Effects of 'Legal High': About Lysergic Acid Amide (LSA)*], 72 *Thérapie* 605 (2017).

⁹⁴ Britannica, *Flunitrazepam*, Encyclopædia Britannica, <https://www.britannica.com/science/flunitrazepam>.

Flunitrazepam enhances a neurotransmitter, called gamma-aminobutyric acid or GABA, that inhibits impulse transmission between neurons. This chemical process reduces brain excitability, leading to the drug's effects: sedation, muscle relaxation, reduced anxiety, and sleep induction. Common adverse reactions include confusion, dizziness, drowsiness, loss of coordination, and memory impairment, earning street names like "roofies" and "forget-me-pill." An overdose can be fatal, potentially causing severe respiratory depression or coma. It poses a high risk of dependence and is associated with severe withdrawal symptoms, such as severe anxiety, insomnia, and seizures.

Flunitrazepam's effects are significantly intensified when combined with alcohol or other central nervous system depressants. Since it is odorless and tasteless when dissolved, perpetrators can easily administer it to a victim's drink without detection. This incapacitates the victim, rendering them unable to resist sexual assault or robbery, and preventing them from retaining any memory of the attack. Thus, it is most notoriously associated with its illicit use as a date-rape drug.⁹⁵

iv. Category (d)

As shown in Table 1, category (d) has *relatively lower* potential for misuse or abuse than category (c), currently has an *accepted* medical use in treatment, and may lead to *milder* physical or psychological dependence than category (c).

a. Nalbuphine

Nalbuphine or Nubain, an opioid painkiller for emergency patients, was sometimes abused as a substitute for methamphetamine by workers in entertainment establishments due to its hallucinogenic properties.⁹⁶ When injected subcutaneously, it is highly addictive and causes severe physical withdrawal symptoms, as well as mental instability such as depression, headaches, hallucinations, and delusions, and side effects such as high blood pressure, pulmonary edema, vomiting, abdominal pain, shortness of breath, itching, cyanosis, speech disorders, and frequent urination.

b. Dextromethorphan (DXM)

DXM, short for dextromethorphan, a cough medicine known as 'lumina,' was also abused as a weight-loss drug by entertainment workers and housewives.⁹⁷ As it is distributed at a

⁹⁵ EBSCO Research Starters, *Rohypnol* (last visited Oct. 23, 2025), <https://www.ebsco.com/research-starters/health-and-medicine/rohypnol>.

⁹⁶ Schiller YE, Goyal A, Mechanic OJ. *Opioid Toxicity*. In: StatPearls. StatPearls Publishing; 2024. <https://www.ncbi.nlm.nih.gov/books/NBK470415/>.

⁹⁷ Gupta, Lovlish, Neha Tomar, & Rajendra Kumar Sarin, *Dextromethorphan: A double-edged drug—Unveiling the pernicious repercussions of Abuse and forensic implications*, 4 Emerging Trends in Drugs, Addictions, and Health 100161 (2024).

significantly lower price than methamphetamine or nalbuphine, young people primarily abuse it for its dissociative and hallucinogenic effects rather than for its proven weight loss.

c. Carisoprodol

Carisoprodol, or brand name ‘Soma,’ known as ‘S-jeong’ in Korean, is a muscle relaxant commonly prescribed for musculoskeletal pain. Like lumina/dextromethorphan, it is low in price, with common per-tablet costs in the U.S. and abroad being well below that of controlled substances.⁹⁸ It is known to some people as a weight-loss drug in unregulated products or misuse contexts, although weight loss is not an approved or evidence-based indication.⁹⁹ Its sedative effects and its abuse potential among those seeking inexpensive alternatives to prescription drugs for weight loss or stress relief are recognized by government authorities.¹⁰⁰

d. Fenfluramine (FFA)

FFA, short for fenfluramine, or brand name ‘Fintepla,’ is the latest antiseizure medication approved in the **European Union**, the **U.S.**, and **Japan** for Dravet and Lennox–Gastaut syndromes.¹⁰¹ Illicit weight-loss drugs containing FFA are often manufactured in China and smuggled to other jurisdictions by peddlers, tourists, and through internet sites with headquarters in **China** under brand names ‘yuzhitang’ or ‘slim-10.’¹⁰² FFA overdose and adverse reactions include headaches, diarrhea, vomiting, and serious risks such as valvular heart disease, pulmonary arterial hypertension, and cardiovascular events.¹⁰³

e. Gamma Hydroxy Butyrate (GHB)

GHB, short for Gamma Hydroxy Butyrate, commonly known in Korean as ‘mool-ppong’ meaning ‘water-poppers,’ is often misused as a ‘date-rape drug’ in clubs and other venues for

⁹⁸ Carisoprodol Price Guide, Drugs.com, <https://www.drugs.com/price-guide/carisoprodol> (last visited Sept. 24, 2025).

⁹⁹ Korea Consumer Agency, Banned drug substances found in certain weight-loss products sold on overseas online shopping malls, Consumer Injury Surveillance Sys., <https://www.ciss.go.kr/english/selectBbsNttView.do?key=594&bbsNo=169&nttNo=12484&searchCtgrY=&searchCnd=all&searchKrd=&pageIndex=16&pageUnit=10&integrDeptCode=> (last visited Sept. 24, 2025).

¹⁰⁰ U.S. Drug Enf't Admin., *Carisoprodol*, https://www.deadiversion.usdoj.gov/drug_chem_info/carisoprodol/carisoprodol.pdf (last visited Sept. 24, 2025).

¹⁰¹ Villanueva, V. et al., *Expert-Agreed Practical Recommendations on the Use of Fenfluramine in Developmental and Epileptic Encephalopathies Based on Clinical Experience and Literature Review*, 14 *Neurol. Therapy* 447, 447–65 (2025).

¹⁰² New Diet Pill Blamed for at Least 1 Death in China, *Voice Of America News* (July 15, 2002), <https://www.voanews.com/a/a-13-a-2002-07-15-13-new-67433567/278249.html>.

¹⁰³ Meredith, A., *Fintepla Side Effects: What They Are and How to Manage Them*, *Med. News Today* (Jan. 30, 2025), <https://www.medicalnewstoday.com/articles/drugs-fintepla-side-effects>.

sexual assault, as it is odorless, colorless, and easily mixed in drinks for covert dosing.¹⁰⁴ It takes effect in 15 to 30 minutes and its effects last 3 to 6 hours.¹⁰⁵ Its street name includes ‘easy lay,’ ‘G,’ ‘Georgia home boy,’ ‘goop,’ ‘grievous bodily harm,’ ‘liquid ecstasy,’ ‘liquid X,’ or ‘scoop.’

Also known as a sedative anesthetic in its sodium oxybate form, GHB is administered intravenously for the induction and maintenance of general anesthesia during surgery, for the sedation of critically ill patients on artificial respiration, and for anesthesia during sleep endoscopy. While it suppresses pain in the central nervous system, it produces a euphoric, relaxing, and sometimes hallucinogenic effect that relieves insomnia, fatigue, and anxiety and creates a feeling of well-being. Its side effects include central nervous system depression, apnea, hypotension, headaches, dizziness, vomiting, convulsions, agitation, and confusion.¹⁰⁶

GHB was first synthesized by Russian chemist **Alexander Mikhaylovich Zaytsev** in 1874, and later by French scientist **Henri Laborit** in the 1960s. It has been developed as an effective treatment for narcolepsy since 1979.¹⁰⁷ In the 1980s and 1990s, it was sold as a growth hormone stimulator for bodybuilders and a sleep aid over the counter in the U.S. In 1991, the FDA banned it after several reports of adverse reactions.¹⁰⁸ In **South Korea**, its abuse for insomnia and anxiety relief became concentrated among entertainment workers and was recognized in 2011.

f. Propofol

Propofol was discovered and developed by **John B. Glen** at the British corporation **Imperial Chemical Industries**, with initial identification in 1973 and clinical trials beginning in 1977.¹⁰⁹ It was first approved for human use in the UK in 1986 and in the U.S. in 1989. It was approved for use in **South Korea** starting in 1992.

This intravenous agent, also known as a sleep anesthetic or sedative-hypnotic, is utilized for the induction and maintenance of general anesthesia during surgery, for the sedation of critically ill patients undergoing mechanical ventilation, and for anesthesia during endoscopic procedures.¹¹⁰ While it suppresses pain in the central nervous system, it can simultaneously cause side effects, including central nervous system depression, apnea, hypotension, headache, dizziness,

¹⁰⁴ Michael A. Buratovich, *GHB*, Research Starters, EBSCO (2024), <https://www.ebsco.com/research-starters/health-and-medicine/ghb>.

¹⁰⁵ U.S. Drug Enf't Admin., *GHB - Gamma-Hydroxybutyric Acid*, DEA (last visited Sept. 25, 2025), <https://www.dea.gov/factsheets/ghb-gamma-hydroxybutyric-acid>.

¹⁰⁶ Ted O'Connell, Lily Kaye & John J. Plosay, III, *Gamma-Hydroxybutyrate (GHB): A Newer Drug of Abuse*, 62 *Am. Fam. Physician* 2478 (2000).

¹⁰⁷ Thomas Roth, *Therapeutic Use of γ -Hydroxybutyrate: History and Clinical Utility of Oxybates and Considerations of Once- and Twice-Nightly Dosing in Narcolepsy*, 39 *CNS Drugs* 37, 37 (2025).

¹⁰⁸ Dianne M. Danis & Tracy McIntyre Ross, *Gamma Hydroxybutyrate Overdose: Two Cases Illustrate the Unique Aspects of this Dangerous Recreational Drug*, 21 *J. Emergency Nursing* 374 (1995).

¹⁰⁹ Discovery and Development of Propofol, a Widely Used Anesthetic, The Lasker Found. (2018), <https://laskerfoundation.org/winners/discovery-and-development-of-propofol-a-widely-used-anesthetic/>.

¹¹⁰ Elyse Dankoski, *The 2018 Lasker-DeBakey Clinical Medical Research Award Recognizes John Baird Glen for the Discovery of Propofol*, 128 *J. Clin. Invest.* 4198 (2018).

convulsions, vomiting, excitement, and confusion.¹¹¹ It has a euphoric effect that alleviates insomnia, fatigue, and anxiety, and induces a feeling of well-being. Due to its abuse, primarily among those employed in the entertainment industry in **South Korea**, it was recognized in 2011.

C. Cannabis

Cannabis, the raw material for marijuana, is one of the world's oldest cultivated plants, domesticated for at least 12,000 years, going as far back as Sumerian farmers in 5,500 B.C.¹¹² It has been used for fiber production and as a therapeutic drug for ailments, such as asthma and headaches, across Asia, Africa, and the Americas. Genetic and archaeological studies trace the original habitat and the first domestication of cannabis to Central Asia, including the Pamir Plateau. Early use was primarily for fiber, but eventually for psychoactive and medicinal purposes as well.¹¹³ The Emperor **Shennong**'s pharmacopoeia, dated to about 2800 BC, lists cannabis among its medicinal plants for treating malaria, rheumatism, beriberi, and constipation, as well as a fiber source.

In **South Korea**, it has been widely cultivated since the Bronze Age primarily for its fiber and hemp textiles. The recreational or smoking of the cannabis herb did not become widespread until the late 20th century, with particular expansion after the 1960s and during the Vietnam War, along with global patterns in psychoactive cannabis use.

The cannabis plant, sometimes called hemp, has been valued historically for: its stem fibers used for cloth, nets, rope, paper; its edible seeds used for seasoning and oil; and its psychoactive leaves and flowers, smoked or ingested for medicinal or recreational effects.¹¹⁴

i. Natural cannabis

Natural cannabis was first used about 12,000 years ago in East Asia, specifically in Neolithic China, for hemp fiber, and later for medicinal use as early as 2900 BCE by Chinese emperors such as **Fu Hsi** and **Shen Nung**.¹¹⁵ Medicinal and recreational uses then spread through Central Asia, the Middle East, and into Europe, with historical references in Herodotus' writings around 440 BCE.

Physical effects include increased heart rate, muscle relaxation, increased appetite, and reddening of the eyes.¹¹⁶ Mentally, it causes altered consciousness, euphoria, creativity boosts, and

¹¹¹ Paul E Marik, *Propofol: Therapeutic Indications and Side-Effects*, 10 *Curr. Pharm. Design* 3639 (2004).

¹¹² *History of Cannabis*, Lambert Initiative for Cannabinoid Therapeutics, U. of Sydney (last visited Sept. 26, 2025), <https://www.sydney.edu.au/lambert/medicinal-cannabis/history-of-cannabis.html>.

¹¹³ Marc-Antoine Crocq, *History of Cannabis and the Endocannabinoid System*, 22 *Dialogues Clin. Neurosci.* 223 (2020).

¹¹⁴ *History of Cannabis*, supra note 72.

¹¹⁵ Marc-Antoine Crocq, *History of cannabis and the endocannabinoid system*, 22 *Dialogues Clin. Neurosci.* 223 (2020).

¹¹⁶ Sandee LaMotte, *Increased marijuana potency linked to addiction, study says*, CNN (July 25, 2022), <https://edition.cnn.com/2022/07/25/health/marijuana-potency-addiction-study-wellness>.

heightened sensory awareness, but can also result in anxiety, paranoia, memory disruption, and, in rare cases, psychosis at high doses. Most users experience mild-to-moderate effects of euphoria and relaxation, but high doses or chronic use increase risks of anxiety, paranoia, and rarely, acute psychosis. Long-term complications may include cognitive impairment, especially in adolescents. Generally considered to have moderate addiction potential, about 9% of regular users may develop a dependence, with higher rates among those who start young or use daily. Cannabis Use Disorder is recognized, with withdrawal symptoms typically mild compared to more potent narcotics.

a. Cannabis herb

Cannabis herb, or ‘Cannabis Sativa Linne,’ is made by drying the leaves and the upper part of the flowering stalks of the cannabis plant and is processed into a cigarette-like form.¹¹⁷

The substance called ‘tetrahydrocannabinol’ (THC), the main psychoactive component of cannabis, is produced relatively abundantly during the seed production period in flowering tops. Smoking THC causes states of intoxication and hallucination.

The product obtained from the flowering heads and leaves of cultivated female hemp plants is called ‘ganja’. The product obtained from wild hemp is called ‘marijuana,’ which originated from the Portuguese word ‘mariguango,’ meaning ‘intoxicant,’ or ‘bhang.’ Marijuana is generally referred to as ‘pot,’ ‘tea,’ ‘grass,’ or ‘weed’ in North and South America.

Cannabis herb exhibits both stimulant and depressant properties simultaneously but is generally categorized as a hallucinogen. When used in small doses, it induces restlessness, a dreamlike state accompanied by relaxation, and increased appetite. It also causes subtle alterations in cognitive processes, along with peculiar changes in sensory perceptions such as sight, smell, touch, and taste. Abuse can lead the user to experience a floating sensation and rapid emotional changes, a loss of concentration, a loss of self-identity, and visual and auditory hallucinations. These symptoms are clear enough to be noticeable by a third party.

The recreational use of cannabis has been legalized: first in **Uruguay** since 2013; in Canada only for adults since 2018; in **Malta** only for adults since 2018; in **Mexico** since 2021; in Luxembourg only for adults since 2023; and in Germany since 2024.¹¹⁸ This has led to a rise in legal and illegal cannabis-derived products, including vapes, edibles, and concentrates, and has presented new challenges with cross-border smuggling of these products.

According to the ‘gateway drug’ theory, the danger of cannabis abuse lies in the increased potential for committing violent crimes while in a hallucinatory state, and the heightened possibility of seeking out other illicit drugs with more potent effects.¹¹⁹ However, this theory is debated, as more research is conducted to find better causations rather than simple correlations or associations.

¹¹⁷ Marijuana, in Encyclopædia Britannica (July 28, 2025), <https://www.britannica.com/science/marijuana>.

¹¹⁸ 10 Countries Where Weed Is Legal in 2025, Bud Hub Cannabis (last visited Sept. 26, 2025), <https://budhubcannabis.com/blogs/blogs/10-countries-where-weed-is-legal-in-2025>.

¹¹⁹ Editorial Staff, *The Truth about Gateway Drugs and Addiction*, Am. Addiction Ctrs. (Dec. 12, 2024), <https://americanaddictioncenters.org/the-addiction-cycle/gateway-drugs>.

b. Hashish

Hashish, meaning ‘grass’ in Arabic, is produced by collecting and pressing the trichome-rich resin from cannabis plants.¹²⁰ It appears as brown, light brown, dark brown, or black lumps. It contains THC ranging from 10% to 60%, making its potency up to 6 times stronger than cannabis herb, which averages from 10% to 15% THC. Traditional hash production is labor-intensive and requires large quantities of herbal cannabis. Roughly 30 kilograms (kg) of flower yields 1 kg of hashish due to the concentration of trichomes or resin glands.¹²¹

Continuous abuse of hashish not only causes psychomotor and endocrine dysfunction and a decrease in immune capacity, but in severe cases, it can also lead to psychoses such as schizophrenia.

c. Hashish oil

Hashish oil is made by chemical extraction and distillation, yielding a concentrated product that typically contains 10% to 30% THC.¹²² Some samples reach even higher concentrations, and modern extractions can exceed 60% to 90% THC.

ii. Synthetic cannabinoids (CBN)

Synthetic CBN, known as ‘K2,’ ‘spice,’ ‘bath salts,’ ‘herbal incense,’ or ‘potpourri’ in legal retail outlets, is an artificially synthesized chemical substances that produce powerful hallucinogenic effects.¹²³ They look similar to marijuana in that they are absorbed onto dried plant leaves. The method of use, such as smoking the vapor or using it in electronic cigarette cartridges, is also similar to smoking marijuana. In contrast, they are chemically completely different from tetrahydrocannabinol (THC), the primary psychoactive ingredient of natural marijuana, but their psychoactive effects can be more substantial or more unpredictable.¹²⁴ They are inexpensive, highly psychoactive, and easy to access and use, leading to their rapid spread among young people. First designated as narcotics in 2009, a total of 6 substances are managed, and analogues created through chemical reactions are also designated as narcotics.

¹²⁰ Hash 101: Everything You Need to Know, Stoops NYC (Aug. 10, 2025), <https://stoopsnyc.com/blog/what-is-hash/>.

¹²¹ Hashish. What is hash and how is it made?, Dutch Passion (last visited Sept. 26, 2025), <https://dutch-passion.com/en/blog/hashish-what-is-hash-and-how-is-it-made-n799>.

¹²² Wash. State Liquor & Cannabis Bd., *Understanding THC Concentration and Potency* (last visited Sept. 26, 2025), <https://lcb.wa.gov/education/understanding-the-concentration-and-potency>.

¹²³ Ministry of Food & Drug Safety, [USA] *Oregon ban on synthetic cannabis products will be nation's first*, (June 16, 2022), https://www.mfds.go.kr/eng/brd/m_60/view.do?seq=75632.

¹²⁴ Office of Nat'l Drug Control Policy, *Synthetic Drugs (a.k.a. K2, Spice, Bath Salts, etc.)* (Feb. 2012), <https://obamawhitehouse.archives.gov/ondcp/ondcp-fact-sheets/synthetic-drugs-k2-spice-bath-salts>.

a. Classical Synthetic CBN

Classical synthetic CBN emerged in the 1960s after Raphael Mechoulam isolated THC from cannabis.¹²⁵ Researchers aimed to explore chemical variations of THC to understand its structure–activity relationships and therapeutic potential. Compounds, such as nabilone and dronabinol, were developed for therapeutic use in chemotherapy-induced nausea, appetite loss in AIDS patients, and chronic pain management. They served as the starting point for the subsequent creation of other cannabinoid analogues used in toxicological and pharmacological studies. Initially intended for medical or research purposes, some later versions were abused as designer drugs due to their psychoactive strength.

Classical synthetic CBN exhibits a higher dependence risk than natural THC, because most act as full agonists rather than partial agonists, meaning they produce a maximal biological response upon binding to the cannabinoid receptors.¹²⁶ Users experience strong euphoria, sedation, alteration of time perception, and amplified visual sensations. Physically, characteristics include rapid heart rate, dizziness, nausea, and dry mouth. Mentally, these substances can induce panic, paranoia, or confusion when overdosed. Due to potency, even microgram differences in dose can drastically change the outcome, sometimes leading to prolonged psychosis or catatonia.¹²⁷

1) HU-210

HU-210, using an abbreviation for **Hebrew University**, is a cannabis component first synthesized by a research team led by Raphael Mechoulam in Israel in 1988.¹²⁸ Because of its similar chemical structure to THC, it is known as a ‘classical cannabinoid.’ It has an effect about 7 to 8 times stronger and between 100 to 800 times more potent than the natural THC from cannabis, and its duration is longer.

b. Non-classical synthetic CBN

Non-classical synthetic CBNs include cyclohexylphenols or 3-arylcyclohexanols, ‘CP’ compounds, developed as potential analgesics by Pfizer, a pharmaceutical company, in the 1980s.¹²⁹ They are the most common street versions of synthetic cannabinoids in typically clear

¹²⁵ United Nations Office on Drugs and Crime, *Synthetic Cannabinoids in Herbal Products* 4 (Apr. 2011), https://www.unodc.org/documents/scientific/Synthetic_Cannabinoids.pdf.

¹²⁶ Avanti Puri et al., *Catatonia Induced by First-Time Use of Synthetic Cannabinoids: A Case Report*, 16 *Cureus* e53324 (2024), <https://doi.org/10.7759/cureus.53324>.

¹²⁷ Marisol S. Castaneto et al., *Synthetic Cannabinoids: Epidemiology, Pharmacodynamics, and Clinical Implications*, *Drug Alcohol Depend.* 12, 41 (2014).

¹²⁸ U.N. Office on Drugs & Crime Laboratory and Scientific Service Portals, *Synthetic Cannabinoids*, <https://www.unodc.org/LSS/SubstanceGroup/Details/ae45ce06-6d33-4f5f-916a-e873f07bde02> (last visited Sept. 24, 2025).

¹²⁹ United Nations Office on Drugs and Crime, *Synthetic Cannabinoids: Details for Synthetic Cannabinoids* (last visited Oct. 28, 2025), <https://www.unodc.org/LSS/SubstanceGroup/Details/ae45ce06-6d33-4f5f-916a-e873f07bde02>.

liquids or crystalline powders that have little or no odor or color, dissolved in solvents and sprayed onto herbal plant matter. They produce more intense and unpredictable psychoactive and physical effects than natural cannabis, often 10 to 100 times stronger than THC.

Users typically experience rapid-onset euphoria, dissociation, hallucinations, agitation, and sometimes severe paranoia or psychosis.¹³⁰ Unlike natural marijuana, non-classical synthetic CBNs are notorious for causing seizures, nausea, vomiting, high blood pressure, tachycardia, and kidney damage. Mentally, users may report a complete loss of sense of self, memory blackouts, or violent behavior. Some describe “trip” experiences as more similar to dissociative. Emergency room staff frequently note unusual, severe, or life-threatening intoxications.

Addiction risk is higher compared to classical cannabinoids because users can quickly develop tolerance, craving, and withdrawal symptoms, including insomnia, irritability, and anxiety. Physical dependence increases with daily or heavy use, and sudden cessation can lead to agitation, mood swings, and flu-like withdrawal symptoms. Young users are reported for “binge” use, compulsive re-dosing, and intense cravings abound.

1) CP-47497

CP-47497, a synthetic cannabinoid, was developed in the 1980s by a pharmaceutical company for scientific and pharmacological research to mimic cannabis effects with possible analgesic properties to activate a pain-relieving effect.¹³¹ It is one of the first synthetic cannabinoids found in recreational drugs and was synthesized and characterized during the 1980s.

iii. Hybrid CBN

Hybrid CBN, a combination of structural features of classical and non-classical CBN, was first identified by **Dr. Makriyannis** and **Dr. Tius** in 1994.¹³²

a. Aminoalkylindoles (AAIs)

AAIs, a class of synthetic cannabinoids originally created not for recreational use but as research tools, are substances with structural features that allow binding to one of the known cannabinoid receptors, CB1 or CB2, present in human cells.¹³³ AAIs, entirely odorless and in white to yellowish powders or waxy solids, are sprayed or dissolved onto inert herbal mixtures.

¹³⁰ Sherrica Tai & William E. Fantegrossi, *Synthetic Cannabinoids: Pharmacology, Behavioral Effects, and Abuse Potential*, *Curr. Addict. Rep.* 1, 129, 134 (2014).

¹³¹ United Nations Office on Drugs and Crime, *Synthetic Cannabinoids in Herbal Products*, https://www.unodc.org/documents/scientific/Synthetic_Cannabinoids.pdf (2010).

¹³² Canatura, *What Are Synthetic Cannabinoids and Why Are They Dangerous* (last visited Oct. 28, 2025), <https://www.canatura.com/a/what-are-synthetic-cannabinoids-and-why-are-they-dangerous>.

¹³³ United Nations Office on Drugs and Crime, *Recommended Methods for the Identification and Analysis of Synthetic Cannabinoid Receptor Agonists (SCRAs) in Seized Materials*, ST/NAR/48/Rev.1 (2020), https://syntheticdrugs.unodc.org/uploads/syntheticdrugs/res/library/forensics_html/Recommended_methods_for_the

AAIs produce much stronger psychoactive effects than naturally occurring cannabis.¹³⁴ Users may experience rapid, intense euphoria, hallucinations, and profound distortion of perception, but equally often face severe agitation, paranoia, anxiety, and psychotic episodes. Physical side effects include racing heartbeat, high blood pressure, nausea, vomiting, muscle twitching, and, in some cases, seizures or collapse. Compared to THC, AAIs have a narrower margin of safety and are more likely to cause hospital-level toxicity or unpredictable behavioral effects, including violence, confusion, and unresponsiveness in users. It is documented that AAIs cause kidney injury and even death in extreme cases. Chronic use can lead to severe mental health problems, sometimes persisting for weeks or months after stopping the drug.

AAIs are considered highly addictive relative to classical cannabis.¹³⁵ Rapid tolerance and marked cravings lead many users to escalate dosing, sometimes several times per session or day. Withdrawal symptoms are severe and include insomnia, tremors, irritability, depression, and powerful drug-seeking urges. Many users describe loss of control, “binging,” and compulsive use patterns more typical of stimulants or opioids. While most classical cannabinoids cause primarily psychological withdrawal, AAI withdrawal is often accompanied by marked physical discomfort, and users may seek medical help for cessation.

1) JWH-018

JWH-018, known as ‘skunk,’ ‘spice,’ ‘spice dream,’ or ‘yucatan fire,’ is a synthetic cannabinoid compound, naphthoylindoles type within AAIs, with a chemical structure different from natural marijuana.¹³⁶ It is typically detected in herbal smoking mixtures, where the compound is sprayed or soaked on dried plant leaves, and sold as a smokable ‘herbal incense’ or ‘spice.’ It inhibits nerve transmission and causes anxiety, agitation, seizures, or convulsions, and its effects are more potent than those of marijuana.

2) AM-2201

AM-2201, using an abbreviation after the professor's English initials of Alexandros Makriyannis who discovered the AM series of cannabinoids at Northeastern University, is a patented synthetic narcotic and a JWH-018 analogue with only fluorine added.¹³⁷ It is absorbed

[Identification and Analysis of Synthetic Cannabinoid Receptor Agonists in Seized Materials ST-NAR-48-Rev.1.pdf](#)

¹³⁴ Sherrica Tai & William E. Fantegrossi, *Synthetic Cannabinoids: Pharmacology, Behavioral Effects, and Abuse Potential*, 1 *Curr. Addict. Rep.* 129 (2014).

¹³⁵ Tamara Vasiljevik et al., *Design, Synthesis and Biological Evaluation of Aminoalkylindole Derivatives as Cannabinoid Receptor Ligands with Potential for Treatment of Alcohol Abuse*, 56 *J. Med. Chem.* 4537 (2013).

¹³⁶ Maheswari Rajasekaran et al., *Human metabolites of synthetic cannabinoids JWH-018 and JWH-073 bind with high affinity and act as potent agonists at cannabinoid type-2 receptors*, 269 *Toxicol. App. Pharmacol.* 100, 100–08 (2013).

¹³⁷ World Health Organization. (2016). *WHO Expert Committee on Drug Dependence: thirty-seventh report* (WHO technical report series; no. 998). https://iris.who.int/bitstream/handle/10665/206452/WHO_TRS_998_eng.pdf.

onto dried plant leaves, then packaged and sold in retail portions of 1 to 10 grams in plastic bags. Its hallucinogenic effect is several times that of JWH-018 and THC.¹³⁸ Because of its unpleasant smell from a fluorine component, it is diluted with wet bread or dried fruit or mixed with herbs for smoking. It is typically sold online under the product names ‘Agent Orange,’ ‘Atomic Bomb,’ ‘Green,’ ‘Jamaican Gold Extreme,’ ‘Manga Xtreme,’ ‘New Bonzai,’ and ‘XoXo.’¹³⁹

III. Conclusion

The preceding analysis has meticulously detailed the elaborate categorization of controlled substances under South Korea’s regulatory framework, encompassing natural narcotics, a diverse array of psychotropic substances, and the constantly evolving class of synthetic compounds. This comprehensive mapping, specifically ranging from traditional opiates to modern New Psychoactive Substances (NPS) such as JWH-018 and AM-2201, underscores the formidable legislative effort to construct a robust legal defense against the proliferation of illegal drugs. This list of controlled substances is likely to be increased with more newer cases acknowledged by the South Korean government agencies.

¹³⁸ World Health Organization. (2015). *WHO Expert Committee on Drug Dependence: thirty-sixth report* (WHO technical report series; no. 991).

https://www.unodc.org/documents/commissions/CND/Mandate_and_Functions/Report_36th_WHO_ECDD.pdf.

¹³⁹ World Health Organization, AM-2201: *Critical Review Report*, in Expert Committee on Drug Dependence, Thirty-sixth Meeting, Geneva, 16-20 June 2014, reprinted in <https://legal-high-inhaltsstoffe.de/sites/default/files/uploads/am-2201.pdf> (2014) (Volker Auwärter & Bjoern Moosmann, *literature review and drafting*).