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PREFACE

The UNODC publication *Terminology and Information on Drugs* introduces basic concepts and materials on substances under international control, which are most frequently manufactured or processed and/or abused, as well as definitions of scientific terms used in this context. The current revision of this publication is being prepared as a response to changes in drug markets and scheduling decisions of the Commission on Narcotic Drugs in recent years.

The publication is neither exhaustive, nor meant to replace more comprehensive textbooks on drugs of abuse. It seeks to collate basic concepts and information on drugs of abuse, their corresponding abuse patterns, pharmacological effects and potential medical use, and act as an accessible and user-friendly resource. The format of this publication is kept simple to allow for brevity. Comments and suggestions for improving content and/or format of this publication by readers are welcome.

Explanatory note

1. Lists of common substances, illicit forms and street names are not extensive listings, but selections. Street names can be ambiguous, and should not be relied upon to characterize a given drug.
2. Sections on chemical constituents of cannabis plant, coca bush and opium poppy are not comprehensive listings, but focus on those substances which are of interest from a drug control point of view. For more detailed chemical information on the substances, the reader is directed to the information mentioned in the monographs of the *Multilingual Dictionaries*[1,2] and the *Clandestine Manufacture of Substances under International Control* (ST/NAR/10/REV.3) manual.
3. The mechanism of action and resulting effects listed are a summary of the most widely recognized desired effects, undesired acute effects and effects due to chronic use of a given substance or group of substances.
4. In order to make the publication more accessible, related information has been displayed in similar tabular forms across each chapter. The following sample shows the format of these tables.

[1] *Multilingual Dictionary of Narcotic Drugs and Psychotropic Substances under International Control*, United Nations publication, 2006 (Sales No. M.06.XI.16).

[2] *Multilingual Dictionary of Precursors and Chemicals Frequently used in the Illicit Manufacture of Narcotic Drugs and Psychotropic Substances under International Control*, United Nations publication, 2015 (ST/NAR/1A*/Rev.1).

Sample formats of tables

Common street names

Common street names		
Bazooka	Coco	Mister Coffee
Big C	Coke	Nose candy
Blanche	Crack	Shake
Blow	Dust	Snow
Cake	Flake	Star dust
Cane	Koks	Toot
Charlie	Lady	White lady

Commonly used forms of substances and their route of administration

	Commonly used forms	Route of administration
Cocaine base	White or off-white crystalline powder with a characteristic odour	Inhalation
Crack	Hard white rocks	Inhalation

Mechanism of action and resulting effects

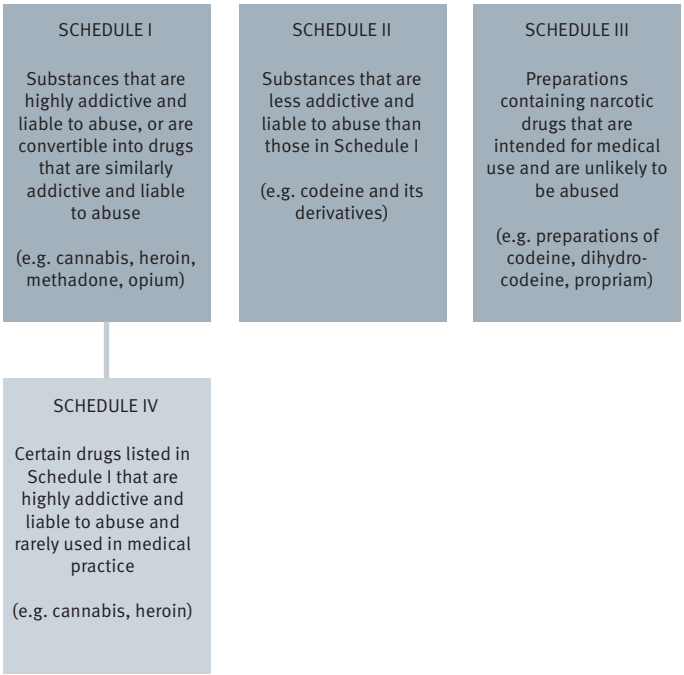
Desired effects	Undesired acute effects	Effects of chronic use
• Sense of physical and mental well-being, exhilaration, euphoria • Increased alertness and energy • Suppression of hunger	• Increased heart rate and blood pressure, faster breathing • Increased body temperature, sweating • Vasoconstriction, local anaesthesia	• Strong psychological dependence • Development of tolerance • Destruction of tissues in nose if insufflated • Chronic bronchitis if smoked

SCHEDULING OF SUBSTANCES

The schedules in the international drug control treaties were established to classify internationally applicable control measures that would ensure the availability of certain substances for medical and scientific purposes, while preventing their diversion into illicit channels.

In the Single Convention on Narcotic Drugs of 1961, as amended by the 1972 Protocol, narcotic drugs and their preparations are essentially listed in four schedules according to their dependence potential, abuse liability and therapeutic usefulness (figure 1) [1].[3]

Figure 1. Single Convention on Narcotic Drugs of 1961



[3] See E/CN.7/2014/10

In the Convention on Psychotropic Substances of 1971, control measures are categorized in four schedules, depending on the relationship between the therapeutic usefulness and the public health risk of the substances. The four schedules use a sliding scale of those two variables: inclusion in Schedule I implies high public health risk and low therapeutic utility, and therefore the strictest control measures, whereas inclusion in Schedule IV implies the opposite: lower public health risk and higher therapeutic utility (see figure 2).[4]

Figure 2. Convention on Psychotropic Substances of 1971

SCHEDULE I	SCHEDULE II	SCHEDULE III	SCHEDULE III
Substances presenting a high risk of abuse, posing a particularly serious threat to public health, which are of very little or no therapeutic value (e.g. LSD, MDMA [“ecstasy”], mescaline)	Substances presenting a risk of abuse, posing a serious threat to public health, which are of low or moderate therapeutic value (e.g. amphetamine and ampheta-mine-type stimulants)	Substances presenting a risk of abuse, posing a serious threat to public health, which are of moderate or high therapeutic value (e.g. barbiturates, including amobarbital, buprenorphine)	Substances presenting a risk of abuse, posing a minor threat to public health, with a high therapeutic value (e.g. tranquilizers, analgesics, narcotics, including allobarbital, diazepam)

[4] See E/CN.7/2014/10

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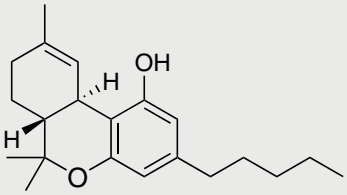
1. Cannabis

"Cannabis" means the flowering or fruiting tops of the cannabis plant (excluding the seeds and leaves when not accompanied by the tops) from which the resin has not been extracted, by whatever name they may be designated [2].

Cannabis contains a number of chemical substances, however the most predominant and only psychoactive substance is (-)-trans-*delta*-9-tetrahydrocannabinol (*delta*-9-THC or THC).



delta-9-THC

MAJOR CANNABINOIDS

Tetrahydrocannabinol (THC)

Cannabidiol (CBD)

Cannabinol (CBN)

Cannabis herbal material

Common street names

420	Joint
Blow	Kif
Blunt	Kush
Bongo	Marie-Jeanne
Dagga	Marihuana
Dimba	Marijuana
Dope	Mary-Jane
Doobie	Pot
Ganja	Sensi
Grass	Sinsemilla
Hash	Skunk
Hemp	THC-candy
Herb	Weed
Joint-sticks	

1.1 CANNABIS PRODUCTS

Cannabis plant

"Cannabis plant" means any plant of the genus *Cannabis* [2]. The cannabis plant, *Cannabis sativa* L. is a single species but is divided into several subspecies; *sativa*, *indica* and *ruderalis*. The cannabis plant, however, exists in many different biological, chemical or morphological varieties.
As a "dioecious" species, the plant can be staminate (male) or pistillate (female). However, there are individual cases of "monoecious" plants or hermaphrodites, where both sexes coexist on one plant. The term "cannabis" is also generally used to describe different products obtained from the cannabis plant.

Cannabis (herb)

Cannabis (herb) is a green or brown dried material, which is listed in Schedule I and IV of the Single Convention on Narcotic Drugs of 1961.

Commonly used forms	Route of administration
Loose material (in a small roll wrapped in paper or onto sticks)	Inhalation (smoking, vaporization)
Ground material (melted in butter, producing "cannabutter" for "hash brownies", or "space-cake"; or infused with hot water as a drink)	Oral consumption

Cannabis resin

"Cannabis resin" means the separated resin, whether crude or purified, obtained from the cannabis plant [2]. Characteristically, cannabis resin is the dried brown or black resinous secretion of the flowering tops of the cannabis plant. Cannabis resin is placed under Schedule I and IV of the Single Convention on Narcotic Drugs of 1961.

Production

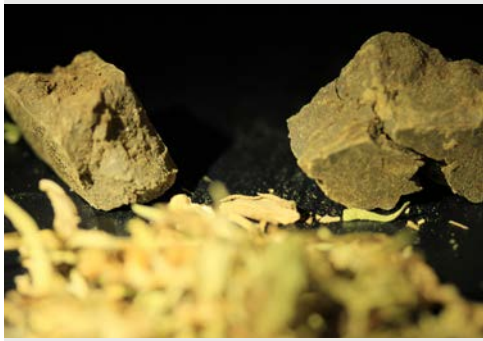
There are a variety of processes and procedures used in different parts of the world to extract and concentrate cannabis resin. For example, in South and South-West Asia, the following techniques are traditionally used:

- The fruiting and flowering tops are rubbed between the palms of the hand, and resin is transferred to the palm.
- Alternatively, the sticky parts of the plant are brushed against rubber sheets, where the resin accumulates.
- The dried herbal material can also be crushed into a powder, exposed to the sun for the resin to melt and later kneaded with wooden rods.
- Another technique is to immerse the plant material in boiling water and remove resin from the surface.

Commonly used forms	Route of administration
Fine powder (also compressed into slabs)	• Inhalation—either alone, or mixed with tobacco • Oral consumption (in the form of food and tea)
Loose or pressed sticky powder	
Resin pressed or rolled into slabs, rods, balls or other shapes	

Cannabis oil

Cannabis oil is obtained by extraction of the crude plant material, cannabis, or cannabis resin with an organic solvent. The extract is then filtered and evaporated to give an oil of required consistency. It is tar-like reddish to brown or green viscous liquid with high levels of THC.



Cannabis resin

Common street names

Charas	Hashish
Chira	Khif
H	Pot
Hash	Shit

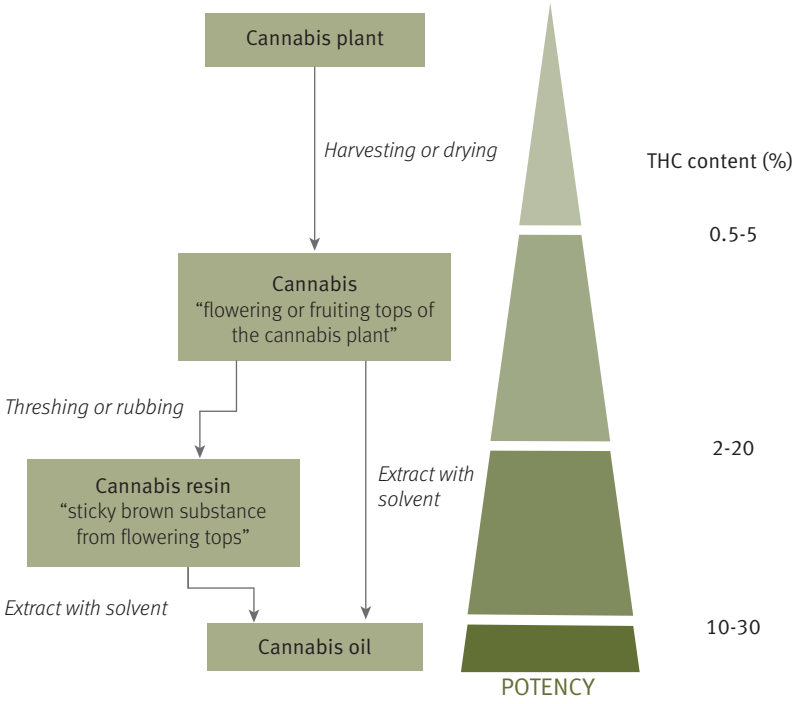
Cannabis resin and oil

Common street names

Butane hash oil
Honey oil
Red oil

Commonly used forms	Route of administration
Viscous liquid	• Inhalation—where 1-2 drops are put on tobacco, or used within a vaporizer • Oral consumption

Production of cannabis, cannabis resin and oil



The THC content of cannabis varies according to the part of the plant and a number of external factors in particular the cultivation conditions and techniques used. In recent years, as a result of advances in plant selection and cultivation, which includes the use of cloning and indoor hydroponic cultivation (growing plants without soil in water or sand in an artificial environment), the content of THC in cannabis has been reported to be as high as 20 per cent by weight in certain countries [3, 4]. The average percentage of THC in cannabis grown under these conditions is generally lower. Cannabis grown using traditional methods or less advanced techniques produces even lower percentages of THC [3, 4].

Medical use

Products that are currently medically approved for therapeutic use include:

- Nabiximol (Sativex®), a liquid cannabis extract of THC and cannabidiol, which is indicated for the treatment of pain and spasticity in multiple sclerosis.
- Dronabinol (Marinol®), a specific synthetic isomer of THC (under Schedule II of the Convention on Psychotropic Substances of 1971) [2], is indicated for the treatment of loss of appetite in patients with AIDS and for severe nausea and vomiting associated with cancer chemotherapy.

There are a variety of ongoing studies on other cannabinoid products for possible therapeutic uses.

Mechanism of action and resulting effects

The psychoactive effects of cannabis are mainly mediated through the activation of the cannabinoid type 1 receptors (CB_1). Activation of these receptors regulates the release of multiple neurotransmitters. Different species of the cannabis plant can have different relative effects due to varying THC levels. Nonetheless, further research is needed to elucidate the full scope of the pharmacological effects and receptors involved.

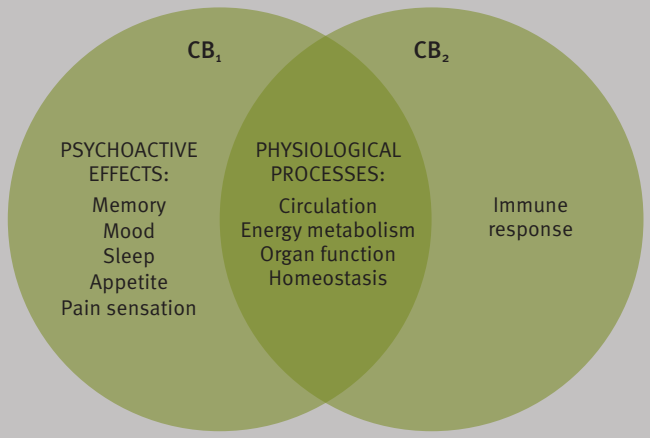
Desired effects	Undesired acute effects	Effects of chronic use
• Sense of well-being, euphoria—a "high" feeling • Merriment • Relaxation • Enhancement of sensory experiences, i.e. more vivid sense of sight, smell, taste and hearing	• Increased heart rate • Impairment of cognitive development (learning), including associative processes, short-term memory, concentration and logical thinking • Impairment of psychomotor performance (i.e. motor coordination, complex tasks) • Potential anxiety, panic, paranoia, or acute psychosis • As effects subside, may lead to quietness, reflectiveness, depression or sleepiness • Reddening of eyes • Perceptions of sound, colour, and other sensations may be distorted, thinking becomes slow and confused	• Potential development of psychological dependence • Development of tolerance • Possible mental health problems • Loss of drive and interest • May pose a risk of lung cancer, acute and chronic bronchitis, lung inflammation, impaired pulmonary defence, and other lung diseases • Exacerbation of psychosis or schizophrenia in vulnerable individuals • Severe risks during use in pregnancy, e.g. impaired foetal development (a reduction in birth weight) or postnatal issues • Potential development of cannabinoid hyperemesis syndrome[a]

[a] *Cannabinoid Hyperemesis Syndrome (CHS)* is a clinical condition of cyclic episodes of nausea, vomiting and abdominal pain, which is caused by long-term or chronic use of cannabinoids

ENDOGENOUS CANNABINOID RECEPTORS

Early analyses of the main psychoactive component of cannabis, delta-9-THC, led to the discovery of endogenous cannabinoid receptors in 1988. The cannabinoid receptor type 1 (CB_1) was first cloned in 1990, whereas CB_2 was cloned in 1993. Presently, it is known that cannabinoids bind to and activate the CB_1 and CB_2 receptors and pharmacological effects are mediated through them. CB1 is mainly located in the central nervous system (CNS), the brain and thalamus, while CB_2 is found outside of the CNS, more peripherally, in the spleen and cells of the immune system.

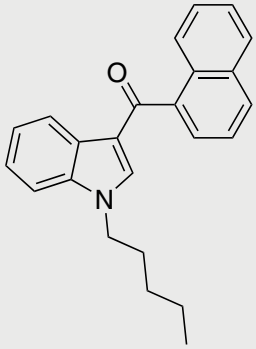
The comprehensive role of receptors in this context in producing pharmacological effects is not yet known. However, the activation of these receptors possibly results in a number of overlapping effects, as shown in the figure below.



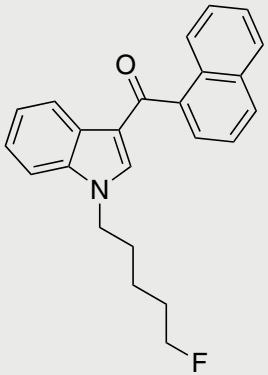
2. Synthetic Cannabinoid Receptor Agonists

Synthetic cannabinoid receptor agonists (SCRAs) are substances with structural features, which allow binding to one of the known cannabinoid receptors. Many of the substances in this structurally diverse group were initially designed for pharmacological research as potential pharmaceuticals to mimic the effects of cannabis. However, none are currently licensed for medical use.

SCRAs on herbal material with packaging



JWH-018



AM-2201

In the mid 2000s products containing SCRAs appeared in which the substances were added to plant material to mimic the herbal nature of cannabis. These products are sold as smokable “herbal blends” and “legal highs” under a variety of brand names such as “Spice”, “K2”, “Kronic” and are labelled as “not for human consumption”.

SCRAs pose a considerable risk to health for a number of reasons. Many of the substances that appear in these products can be much more potent than THC. Also the content of products can vary both in terms of the actual substance or mixture of substances present and their concentration(s). As of October 2015, over 200 different SCRAs have been reported to UNODC.

Two SCRAs, namely JWH-018 (Naphthalen-1-yl(1-pentyl-1*H*-indol-3-yl)methanone) and AM-2201 ([1-(5-fluoropentyl)-1*H*-indol-3-yl](naphthalen-1-yl)methanone), were placed under international control, following scheduling decisions of the 58th Commission on Narcotic Drugs (CND) in 2015 [2].

Commonly used forms	Route of administration
Herbal mixture, i.e. liquid solution of substance, dissolved in organic solvent and sprayed onto plant material	Inhalation (including vaporization)
White crystalline solid	Oral consumption
Powder	• Nasal insufflation • Oral consumption
Tablet	Oral consumption

2.1 MECHANISM OF ACTION AND RESULTING EFFECTS

JWH-018 and AM-2201 are both full agonists of the CB_1 cannabinoid receptor. However, a lot of the pharmacological information, including the long-term effects of these substances is still unknown. Studies of potency in humans do not exist and users do not know what they are consuming, often leading to wrong doses and severe side effects due to overdose.

While the pharmacological effects are similar to those caused by THC, a number of additional effects, which are specific to SCRAs, are also listed below.

Undesired acute effects

- Seizures (convulsions), loss of consciousness
- Vomiting, drowsiness, chest pain
- Agitation, hot flushes
- Dilation of pupils, dry mouth

Common street names*

JWH-018
Atomic Bomb
Chillin XXX
Dragon
K2
Monkees Go Bananas
Rockstar
Spice Head
Spike 99
Ultra
Wasted

AM-2201
Agent Orange
Atomic Bomb
Green
Jamaican Gold Extreme
Manga Xtreme
New Bonzai
XoXo

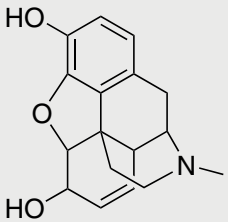
**Note:* Brand named products of SCRAs can differ from packet to packet, often contain substances other than those advertised, and can include multiple substances.

3. Opium and opiates

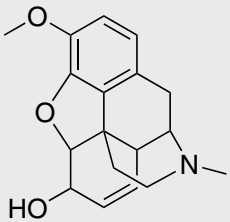
"Opium" means the coagulated juice of the opium poppy, where "opium poppy" means the plant of the species *Papaver somniferum* L. [2]. *Papaver somniferum* L. is a plant that grows in many countries around the world with moderate climates. It has white to red flowers and round to elongated capsules containing seeds which can range in colour from white to dark violet.

Opium poppies

Opium seeds



Morphine



Codeine

There are a number of psychoactive substances that can be extracted from opium, with morphine and codeine being the most predominant.

MAJOR ALKALOIDS

	Percentage
Morphine	3.1 – 19.2
Codeine	0.7 – 6.6
Thebaine	0.2 – 10.6
Papaverine	‹0.1 – 9.0
Noscapine	1.4 – 15.8

3.1 OPIUM PRODUCTS

Raw opium

Raw opium is a non-homogeneous material containing poppy capsule fragments. It is sticky, tar-like and dark brown when fresh, and becomes brittle and hard as it ages. Raw opium is produced by the air drying of opium.

Commonly used forms	Route of administration
Sticky or hard, dark brown material in any form or shape	• Oral consumption (chewed) • Inhalation
Blocks wrapped in vegetable leaves followed by plastic wrapping	Oral consumption (chewed)

Production

Raw opium is harvested from the seed capsule of the poppy, while the capsule is still in the green stage. The opium latex is obtained by making a series of shallow incisions into the capsule, which allows the latex to run onto its surface and be collected.

Prepared opium

Prepared opium is a sticky dark product obtained as a result of various treatments of raw opium, e.g. water extraction, in order to make it suitable for smoking.

Commonly used forms	Route of administration
Sticky or hard, dark brown material in any form or shape	Inhalation
Sticks in the form of cigarettes	Inhalation

Common street names

Ah-pen-yen
Black Stuff
Hop
Mud
Noir(e)
O
Tar

Prepared opium

Common street names

Chandu
Sukhteh

Medicinal opium

"Medicinal opium" means opium which has undergone the processes necessary to adapt it for medicinal use [2].

Common forms

Light yellowish-brown powder consisting of yellowish or reddish-brown particles.

Approved medical preparations of opium

Tincture
Fine brown powder
Pastilles
Syrup

Poppy straw

"Poppy straw" means all parts (except the seeds) of the opium poppy, after mowing [2], which includes the dried upper part of the stem and the capsules of the poppy plant.

Concentrate of poppy straw

The material arising when poppy straw has entered into a process for the concentration of its alkaloids, when such material is made available in trade [2].

Commonly used forms	Route of administration
Brown or off-white powder [7]	Oral consumption

3.2 OPIATES

Opiates are naturally occurring alkaloids of the opium poppy (*Papaver somniferum* L.), such as morphine, codeine, thebaine, etc. The term is often used interchangeably with opioids. However, opioids are synthetic compounds, which are derived from opiates but are not opiates themselves (see section 4). Opium, concentrate of poppy straw, morphine and heroin are under Schedule I of the Single Convention on Narcotic Drugs of 1961.

Morphine

Morphine is the most prevalent alkaloid extracted from opium or poppy straw. Its colour ranges from off-white to dark brown. Morphine can be found compressed into blocks with a variety of trademarks or names.

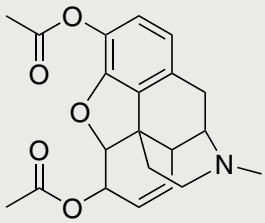
Commonly used forms	Route of administration
Finely ground powder	Injection
Tablets	Oral consumption

Heroin

Heroin (diamorphine or diacetylmorphine) is a semi-synthetic opiate synthesized from morphine. There are two main types, namely the water soluble diacetylmorphine hydrochloride salt and the relatively water insoluble diacetylmorphine base and both can appear in a range of colours from white to brown.

Following injection, heroin is rapidly broken down in the blood to the pharmacologically active 6-monoacetylmorphine and then to morphine, the major active metabolite.

Compared to morphine, heroin is more fat-soluble (due to its two acetyl groups), and crosses the blood-brain barrier more rapidly, usually in 15-20 seconds, and achieves relatively higher levels in the brain following intravenous injection, with almost 70 per cent of the dose absorbed into the brain. Oral administration of heroin results in



Heroin

Heroin No.3

Common street names

Black tar	Horse
Boy	Joy powder
Chiva	Junk
Dope	Skag
Dragon	Smack
H	Snow
Hairy	White lady
Harry	White stuff

extensive breakdown to morphine [8]. Heroin is approximately twice as potent as morphine and has a high potential for abuse.

RISKS OF INJECTION DRUG USE

Injecting drug use can lead to a number of severe infectious diseases. In particular, the sharing of needles or any other injection tools and injection using non-sterile and contaminated apparatus can transmit blood borne viral infections, such as HIV and/or hepatitis, pneumonia and other lung infections, and lead to cardiovascular issues.

There are four regions in the world that have reported the production of heroin, namely South-West Asia, South-East Asia, Central America and South America. As such there are a variety of names that are used to designate the heroin in its various stages of refinement/purification which depend on the complexity of the processes used. These can include, for example, brown heroin and black tar heroin. In South-East Asia for example, heroin can be distinguished into several classes and the following terms are used:

Commonly used forms

Heroin No. 2	Heroin base prior to its conversion to the hydrochloric salt: white to off-white, pale grey or dark brown, solid or powdered.
Heroin No. 3	Smokable form of heroin. Hard granular material ranging from light brown to dark grey, red or pink at times. Heroin No. 3 can be 20-40 per cent pure, although it is often lower e.g. less than 10 per cent and containing adulterants such as caffeine.
Heroin No. 4	Injectable form of heroin. It is a white powder, with little odour. Purity is high and may reach up to 99 per cent heroin hydrochloride (however, street purity is variable depending on adulterants added).

The main methods for the use of heroin are injection, nasal insufflation and inhalation by smoking.

Medical use

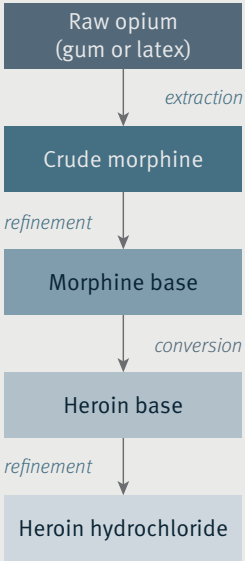
Opium and opiates are still widely used in medicine to relieve symptoms of a variety of ailments. Morphine, for example, is used as an analgesic in cases of chronic pain management and for post-operative pain, while codeine is also used to treat a cough and mild to moderate pain. In some countries, heroin is also prescribed for pain management [9].

Mechanism of action and resulting effects (opium, morphine, heroin)

The pharmacological effects of morphine, heroin and other opiates are mediated through their interaction with opioid receptors and inhibitory neurotransmitters. Opioid receptors are responsible for triggering brain reward systems and producing analgesia (pain relief) by decreasing pain transmission. Different types of opioid receptors exist, among them are mu (μ) receptors, which mediate analgesic and behavioural effects.

Desired effects	Undesired acute effects	Effects of chronic use
• Sense of well-being and euphoria • Warmth, contentment, relaxed detachment from emotional and physical distress • Analgesia (pain relief)	• Drowsiness, inability to concentrate, apathy, lessened physical activity • Potential nausea and vomiting • Possible respiratory depression, which may lead to death • Potential stimulatory effects • Constriction of pupils	• Rapid development of tolerance and physical and psychological dependence • Damage of structures in nose if sniffed or snorted • Respiratory problems if smoked • Malnutrition, weight loss • Chronic sedation, apathy • Constipation • Menstrual irregularity • Withdrawal syndrome (cramps, diarrhoea, runny nose, tremors, panic, fever, chills, uncontrollable shaking and sweating, etc.)

Production of morphine and heroin*

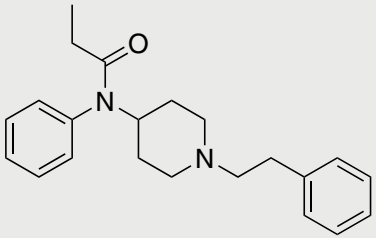


*Poppy straw can be used as a source of crude morphine and codeine can be used to derive morphine base.

4. Opioids

Opioid is a generic term applied to opiates and their synthetic analogues, which can be semi- or fully synthetic, with actions similar to those of morphine. Therefore, opioids are commonly used as painkillers, for the treatment of acute and chronic pain, and as an anaesthetic during surgery. Synthetic opioids are structurally diverse, can be extremely potent, and include a variety of substances including a number of fentanyl derivatives, methadone, buprenorphine and AH-7921.

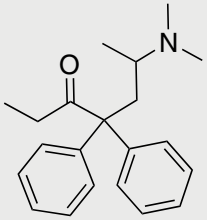
4.1 FENTANYLS



Fentanyl

Fentanyls are a group of short-acting, highly potent synthetic opioids with narcotic analgesic properties. Thirteen fentanyl compounds (acetyl-*alpha*-methylfentanyl, alfentanil, *alpha*-methylfentanyl, *alpha*-methylthiofentanyl, *beta*-hydroxyfentanyl, *beta*-hydroxy-3-methylfentanyl, fentanyl, 3-methylfentanyl, 3-methylthiofentanyl, *para*-fluorofentanyl, remifentanil, sufentanil and thiofentanyl) are under Schedule I of the Single Convention on Narcotic Drugs of 1961. Of these, four (alfentanil, fenantyl, remifentanil and sufentanil) are currently approved for medical use. There are however a range of fentanyls that are produced clandestinely. They are often sold mixed with heroin, and can have severe repercussions for users as a result of their high potency.

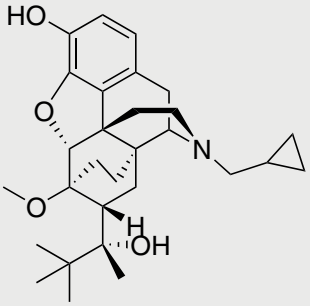
4.2 METHADONE AND BUPRENORPHINE



Methadone

Methadone and buprenorphine are long-acting, commonly used synthetic opioid therapeutic drugs for detoxification or maintenance therapy in opioid dependence. Both methadone and buprenorphine are on the *WHO Model Lists of Essential Medicines* [10], and are used to treat dependence [11], for example, opioid substitution treatment or HIV prevention in people who inject drugs.

4.3 AH-7921



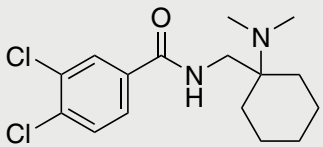
Buprenorphine

AH-7921 is a synthetic opioid with analgesic opioid-like properties generally equipotent to morphine. Originally designed and investigated as a pharmaceutical opioid analgesic medicine, AH-7921 has not shown therapeutic applications and is not a licensed product.

4.4 MECHANISM OF ACTION AND RESULTING EFFECTS

The effects of synthetic opioids are mediated through their interaction with inhibitory neurotransmitters and opioid receptors, as is the case for opium and opiates (see section 3.4).

Desired effects	Undesired acute effects	Effects of chronic use
• Euphoria • Relaxation • Analgesia (pain relief) • Alertness	• Respiratory depression, sedation • Nausea, vomiting • Dizziness, fatigue, headache • Drowsiness, constipation, sweating • Anaemia, peripheral oedema • Muscle rigidity	• Development of dependence and tolerance • Potential cardiac arrest or severe anaphylactic reaction • Withdrawal symptoms (sweating, anxiety, diarrhoea, bone pain, abdominal cramps, shivers or “goose flesh”) • Constipation



AH-7921

Common street names

Fentanyls
Apache
China white
Drop dead
Synthetic heroin

Methadone
Chocolate-Chip Cookies
Dollies
Meth
Wafers

AH-7921
Doxylam
Doxylan

Buprenorphine
Bupe
Subs
Tems

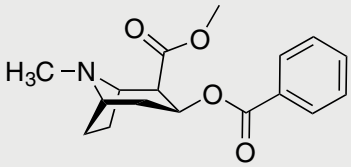
5. Coca and Cocaine

5.1 COCA PRODUCTS

Coca bush

"Coca bush" means the plant of any species of the genus *Erythroxylon* [2].

The coca plant (e.g. *Erythroxylon coca, Erythroxylon novogranatense*) grows in tropical climates (500-2,500 metres above sea level) as a bush or tree. Its leaves can be harvested for about 20 years.



Cocaine

Coca leaf

"Coca leaf" means the leaf of the coca bush except leaf from which all ecgonine, cocaine and any other ecgonine alkaloids have been removed [2]. This definition is specific to the Single Convention on Narcotic Drugs of 1961.

Coca plant

Common street names

Basuco
Bazuco
Pasta base
Paco

Commonly used forms	Route of administration
Green to yellow-greenish elliptical leaves of different *Erythroxylon* species varying in size and appearance. The two lines parallel to the midrib on the underside of the coca leaf are distinctive.	Oral consumption. Coca leaf is chewed in combination with an alkaline compound (such as bicarbonate or plant ash to assist extraction of the alkaloids) or is brewed as a tea named "mate de coca".

Chemical constituents of coca

MAIN ALKALOIDS
Cocaine (benzoylmethylecgonine)
Cinnamoylcocaine
Benzoylecgonine
Methylecgonine
Ecgonine

The amounts of the different alkaloids present in coca leaves depend on a number of factors, including the species, altitude at which the plant is grown, and age. The main psychoactive substance present in coca leaves is cocaine (benzoylmethylecgonine), which is generally present in the range of 0.3-1 per cent.

Coca paste

Coca paste is a crude extraction of the leaves of the coca bush. It contains coca alkaloids, 50-85 per cent cocaine and toxic impurities, such as sulphuric acid. Coca paste often contains aggregates, is damp and has a characteristic odour.

Commonly used forms	Route of administration
Brown adhesive material to an off-white creamy or beige coarse powder	Inhalation either alone or mixed with tobacco

Street names for coca paste vary depending on the country of production and the form. A particular street name for coca paste can also refer to different products in different countries.

Cocaine

Cocaine is the main psychoactive alkaloid obtained from coca leaves. It is generally encountered in two forms which differ in their route of administration. Cocaine hydrochloride, which is insufflated or injected, and cocaine base, which is a smokable form.

Crack and freebase are terms used for different forms of cocaine base generated from purified cocaine hydrochloride through specific conversion processes to make them suitable for smoking. Inhalation of the heated vapours of cocaine base results in a quick onset of effects due to the rapid absorption of the substances in the lungs. However, inhalation of cocaine pyrolysis products can be toxic and cause respiratory problems.

	Commonly used forms	Route of administration
Cocaine base	White or off-white crystalline powder with a characteristic odour	Inhalation
Crack	Hard white rocks	Inhalation
Cocaine hydrochloride	White or off-white crystalline powder	• Nasal insufflation • Injection (intravenous or subcutaneous, “skin popping”, however, this is rare)

Cocaine, coca leaf, and ecgonine (including its esters and derivatives, which are convertible to ecgonine and cocaine) are under Schedule I of the Single Convention on Narcotic Drugs of 1961.

The following diagram shows the general processes by which coca leaf is transformed into cocaine products in their various forms. The illicit production processes may vary

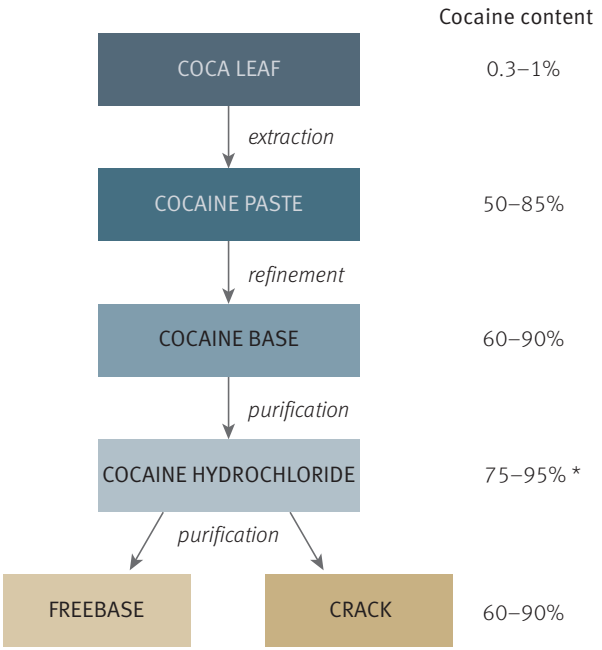
Crack

Common street names

Bazooka	Coco	Mister Coffee
Big C	Coke	Nose candy
Blanche	Crack	Shake
Blow	Dust	Snow
Cake	Flake	Star dust
Cane	Koks	Toot
Charlie	Lady	White lady

from one laboratory to another; there are at least five reported methods for obtaining coca paste, cocaine base or cocaine hydrochloride. Illicit supplies of cocaine are often heavily adulterated with a variety of "cutting agents" and may contain as little as 10 per cent cocaine.

Production of cocaine



**Note:* Street purity can be much lower

Medical use

Cocaine hydrochloride solutions offer limited use as a local anaesthetic, except in certain cases of ear, nasal or throat surgery [12]. More effective and less harmful alternatives, such as benzocaine, lidocaine, prilocaine or combinations of these substances, are more commonly used in medical practice [13].

Mechanism of action and resulting effects

The stimulatory properties of cocaine use are a result of its action on the dopamine, norepinephrine and serotonin neurotransmitter systems. To a certain extent, the effects of cocaine are similar to those of amphetamine and methamphetamine. However, cocaine has a more pronounced effect on the levels of dopamine than amphetamine or methamphetamine.

Desired effects	Undesired acute effects	Effects of chronic use
• Sense of physical and mental well-being, exhilaration, euphoria • Increased alertness and energy • Suppression of hunger	• Increased heart rate and blood pressure, faster breathing • Increased body temperature, sweating • Vasoconstriction, local anaesthesia • Hyper-excitability, insomnia, restlessness, panic, erratic, sometimes violent behaviour. • May lead to convulsions, seizures, hallucinations, stroke, cerebral haemorrhage or heart failure • Dysphoria, tiredness, irritability and depression • Serotonergic syndrome • Dilation of pupils	• Strong psychological dependence • Development of tolerance • Destruction of tissues in nose if insufflated • Chronic bronchitis if smoked • Malnutrition, weight loss • Disorientation, apathy, confusion, exhaustion due to lack of sleep • Paranoid psychosis • During withdrawal there may be a long period of sleep and depression

6. Amphetamine-type Stimulants

Amphetamine-type stimulants (ATS)[5] refer to a group of drugs, mostly synthetic in origin, whose principal members include amphetamine, methamphetamine and MDMA (ecstasy). Use of these substances has a stimulatory effect on the central nervous system and influences the levels and action of the important neurotransmitters: dopamine, norepinephrine and serotonin. The action of these neurotransmitters induces a range of excitatory responses in the central nervous

[5]The term "amphetamine-type stimulants" (ATS) was coined during the WHO Meeting on Amphetamines, MDMA and other Psychostimulants in Geneva, 1996 [14]. This term was adopted by the meeting participants for the purpose of grouping a number of drugs that were prominent at the time, namely amphetamine, methamphetamine and MDMA (ecstasy), among others. Moreover, it excluded cocaine, nicotine and certain herbal stimulants. A pragmatic justification was established to simplify the overarching class to a group of substances that are similar in their pharmacological effect and chemical structure. This grouping therefore incorporated substances, which were more or less structurally alike.

Amphetamine powder

Yaba tablets containing methamphetamine

system. The differing degrees to which a substance affects these neurotransmitters contributes to the psychostimulant properties of individual ATS. There are also a number of synthetic stimulants that bear little structural similarity to ATS but have comparable mechanisms of action.

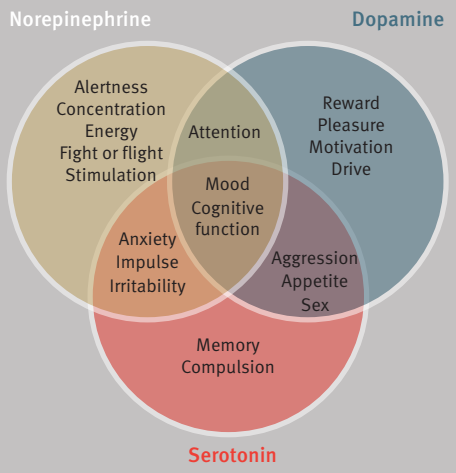
EXCITATORY NEUROTRANSMITTER SYSTEMS

The three monoamine neurotransmitters—dopamine, norepinephrine and serotonin—are critical components of neurotransmission. These neurotransmitters are released into neuronal synapses and their concentrations are modulated by membrane proteins.

The presence and/or levels of these three neurotransmitters produce a variety of effects as displayed in the table below.

Dopamine (DA)	Norepinephrine (NE)	Serotonin (5-HT)
Controls the reward and pleasure centre of the brain	Affects parts of the brain where attention and responding actions are controlled	Affects a variety of physiological processes, ranging from mood to appetite and memory

There are a number of overlapping effects, and the complexity of their relationship is illustrated below.



6.1 AMPHETAMINE AND METHAMPHETAMINE

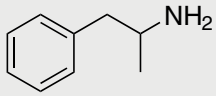
Amphetamine and methamphetamine produce predominantly stimulant effects as a result of their influence on the levels of dopamine and norepinephrine, and, to a lesser extent, on serotonin. Both substances are under Schedule II of the Convention on Psychotropic Substances of 1971.

Amphetamine and methamphetamine found in illicit markets are predominantly produced in clandestine laboratories. This is primarily related to the ease of synthesis and the availability of a variety of precursors and methods that can be used for their manufacture.

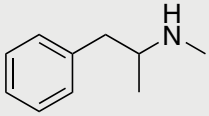
Commonly used forms	Route of administration
White to light brown powder	• Nasal insufflation • Smoking
Solution of powder dissolved in distilled or saline water	Injection
Tablets and capsules (in different shapes and colours)	Oral consumption
Crystals (commonly methamphetamine)	• Nasal insufflation • Smoking

The different methods by which these forms can be administered impacts the onset and duration of action. For instance, insufflation causes quick absorption into the bloodstream through the mucosa and so enables a more rapid onset of effects than oral consumption. In general, only methamphetamine is commonly found in the crystal form.

Methamphetine crystals



Amphetamine



Methamphetamine

Common street names

Amphetamine	Methamphetamine
Amp	Black beauties
Base	Chalk
Bennies	Crank
Crystal	Crystal
Dexies	Crystal meth
Speed	Glass
Sulph	Go-ey
Uppers	Ice
Whizz	Meth
	Shabu
	Speed
	Yaba

SEROTONERGIC OR SEROTONIN SYNDROME

Serotonergic syndrome is an extreme adverse drug reaction, which is caused by excessive use of serotonergic drugs (drugs which influence the serotonin system) and is potentially fatal. It results from serotonin toxicity, i.e. extremely high levels of serotonin in the central nervous system induced by serotonergic drugs. Serotonergic syndrome may induce psychosis, high blood pressure (hypertension), high body temperature (hyperthermia), uncontrollable muscle spasms (myoclonic crisis), tremors, seizures, release of myoglobin from muscles and blood clotting in vessels. If not treated immediately, it may lead to severe illness and potential death.

Medical use

There are a number of products containing amphetamine or methamphetamine, which are approved for medical use and predominantly prescribed to treat attention deficit hyperactivity disorder (ADHD), for example, Adderall® (a mixture of the chiral *d*- and *l*- salts of amphetamine) or Desoxyn® (*d*-methamphetamine). Amphetamine is also used in the treatment of narcolepsy and as an appetite suppressant [15].

Mechanism of action and resulting effects

Amphetamine and methamphetamine affect neurotransmitters through a number of mechanisms, namely by inducing the release and preventing the reuptake of dopamine, norepinephrine and, to a lesser extent, serotonin. They also inhibit the metabolism of dopamine and norepinephrine. The combination of these processes produces the stimulant effects, such as increased energy, heart rate and blood pressure.

Desired effects	Undesired acute effects	Effects of chronic use
• Sense of physical and mental well-being, exhilaration • Mental and physical stimulation • Increased and prolonged alertness and energy • Improved performance at manual or intellectual tasks • Suppression of hunger	• Increased heart rate and blood pressure, faster breathing • Increased body temperature, sweating • Erratic, sometimes violent behaviour • Hyper-excitability, insomnia, talkativeness, restlessness, irritability, hallucinations • Convulsions, seizures, arrhythmia and/or heart failure, cerebral haemorrhage • Serotonergic syndrome • Dilation of pupils	• Strong psychological dependence • Development of tolerance • Malnutrition, weight loss • Disorientation, apathy, confused exhaustion due to lack of sleep • With continued use, a state similar to paranoid psychosis may develop (known as “amphetamine psychosis”) • During withdrawal there may be a long period of sleep and depression

6.2 “ECSTASY” GROUP SUBSTANCES

This group comprises synthetic substances such as MDMA (3,4-methylene-dioxymethamphetamine) MDA (3,4-methylenedioxyamphetamine) and MDEA (3,4-methylenedioxyethylamphetamine).

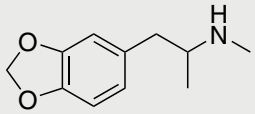
Similarly to amphetamine and methamphetamine, these substances have stimulant properties and affect, to varying degrees, the levels of the three neurotransmitters dopamine, norepinephrine and serotonin. However, the more pronounced effect on the serotonin neurotransmitter system leads to some differences in their overall pharmacological effects and is likely to be responsible for the empathogenic/entactogenic effects of “ecstasy” group substances [16, 17].

The aforementioned “ecstasy” group substances are produced in clandestine laboratories, have no approved medical use, and are under Schedule I of the Convention on Psychotropic Substances of 1971.

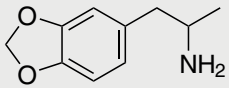
Commonly used forms	Route of administration
White to off-white powders	• Occasionally insufflation • Injection (rarely)
Tablets and capsules	Oral consumption

Mechanism of action and resulting effects

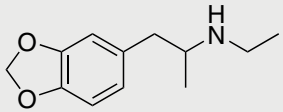
In addition to producing stimulant effects similar to those of amphetamine and methamphetamine, “ecstasy” group substances, to varying degrees, have more pronounced effects on inhibition of serotonin reuptake and can also exhibit binding affinity for serotonin receptors, which is likely to be responsible for its empathogenic/entactogenic effects and potentially related to hallucinogenic effects at higher doses.



MDMA



MDA



MDEA

Common street names

Adam	MDMA
E	Molly
Ecstasy	XTC
Essence	Eve
Love drug	MDE
MDM	MDEA

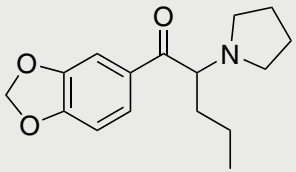
"Ecstasy" tablets

Desired effects	Undesired acute effects	Effects of chronic use
• Feelings of emotional closeness to others (empathy) • Facilitation of communication • Increased sociability (use at so-called "rave" dance parties) • Increased physical and emotional energy	• Rise in blood pressure and heart rate, heat stroke • Fatigue and potential depression • Restlessness, anxiety and pronounced visual and auditory hallucinations at high doses • Nausea and vomiting • Hyperthermia • Serotonergic syndrome	• Development of tolerance • Possibility of neurotoxicity, psychiatric and physical problems and brain damage as well as liver damage • Potential depression, anxiety, fatigue, and difficulty in concentrating

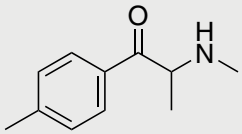
6.3 SYNTHETIC CATHINONES

Synthetic cathinones are *beta*-keto phenenthylamines that are similar to amphetamine, methamphetamine and MDMA in structure and mechanism of action. A number of synthetic cathinones are under international control including mephedrone, methylenedioxypyrovalerone (MDPV) and methylone. None of these substances are currently approved for medical use.

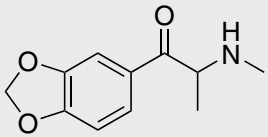
	Commonly used forms	Mechanism of action
MPDV	• Powder • Tablet	• Similar to amphetamine and methamphetamine • Stimulant properties
Mephedrone	• Powder • Tablet • Liquid (for injection)	• Similar to amphetamine and methamphetamine • Stimulant properties
Methylone	• Powder • Tablet • Liquid (for injection)	• Similar to MDMA • Stimulant and entactogenic properties



MDPV



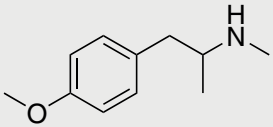
Mephedrone



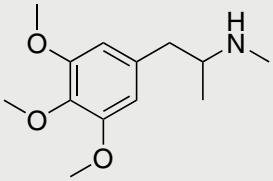
Methylone

Common street names

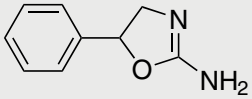
Bath salt	Mdmcat
Bk-MDMA	Mef
Cristal bath	Meow
Ease	Neocor
Explosion	New Ivory Wave
Flower Power	Plant food
M1	Special
Magic	Super coke
MP	



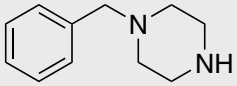
PMA



TMA



Aminorex



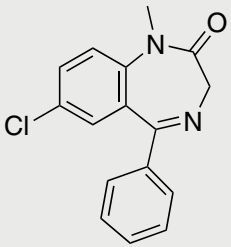
BZP

6.4 OTHER SYNTHETIC CNS STIMULANTS

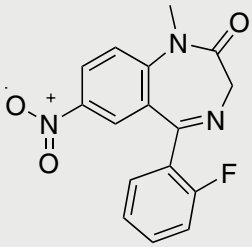
There are a range of synthetic stimulants that can produce comparable effects to amphetamine, methamphetamine or “ecstasy” group substances but are not necessarily structurally similar. Some examples of substances in this category include 1-benzylpiperazine (BZP), aminorex, *para*-methoxyamfetamine (PMA) and 3,4,5-trimethoxyamfetamine (TMA).

7. Central Nervous System Depressants

Central nervous system (CNS) depressants are primarily used as medicines that suppress, inhibit or decrease brain activity. The main classes of CNS depressants are sedatives, hypnotics, opioids and neuroleptics [18]. CNS depressants include benzodiazepines, barbiturates, methaqualone and GHB (*gamma*-hydroxybutyric acid).



Diazepam



Flunitrazepam

7.1 BENZODIAZEPINES

Common street names

Benzos
Blue bomb
Downers
Nerve pills
Canasson rouge

Benzodiazepines are a structural group of CNS depressants that are widely used in medicine as anticonvulsants, anxiolytics, hypnotics, sedatives, skeletal muscle relaxants and tranquilizers. Numerous benzodiazepines have been synthesized for use as pharmaceuticals and they can vary considerably in their potency and in the onset and/or duration of action. In total, 35 benzodiazepines are currently subject to international control under the Convention on Psychotropic Substances of 1971. Benzodiazepines encountered on the illicit market are primarily diverted from legitimate trade rather than synthesized in clandestine laboratories.

COMMON PHARMACEUTICAL BENZODIAZEPINES	DURATION OF ACTION*
Alprazolam (Xanax®)	Short (half-life <10 hours)
Diazepam (Valium®)	Long (>24 hours)
Chlordiazepoxide (Librium®)	Long (>24 hours)
Flunitrazepam (Rohypnol®)	Intermediate (10-24 hours)
Temazepam (Restoril®)	Short (<10 hours)

Commonly used forms	Route of administration
Tablets and capsules	Oral consumption
Liquids (gel) in capsules	Injection

gamma(γ)-AMINOBUTYRIC ACID (GABA)

gamma(γ)-aminobutyric acid (GABA) is an example of an inhibitory neurotransmitter, which is critical in mediating sedative and therapeutic effects. It is located in the brain and spinal cord and helps regulate brain activity by reducing neurotransmission, which slows down normal functions of the body and culminates in depressant effects.

Depressant effects can also result from blocking the action of excitatory neurotransmitters (e.g. glutamate that acts on glutamate receptors [AMPA or NMDA]), which interrupts their main functionality of producing stimulatory effects and thus contributes to the depressant effects.

Mechanism of action and resulting effects

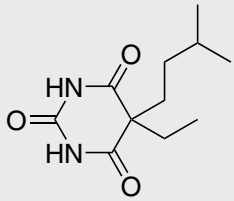
The depressant properties of benzodiazepines are derived from their effects on a combination of receptors in the $GABA_A$ receptor complex in the brain. Primarily, the benzodiazepines enhance the action of the neurotransmitter *gamma*-aminobutyric

acid (GABA) at the $GABA_A$ receptor to produce their sedative, hypnotic, anxiolytic, anticonvulsant and muscle relaxant effects.

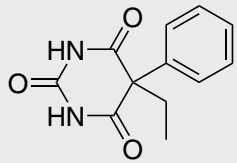
Desired effects	Undesired acute effects	Effects of chronic use
• Relief of tension, mental stress and anxiety • Positive feelings of calmness, relaxation and well-being in anxious individuals • Improved coping with situational pressures or psychological problems • Relief of side effects associated with over-stimulation or withdrawal of other drugs (i.e. as part of a pattern of multiple drug use)	• Reduced mental activity and alertness, drowsiness, lethargy and impairment of clarity of thought and judgement may occur • Potential impairment of muscle coordination, dizziness, low blood pressure, or fainting • Diminished emotional responses to external stimuli, e.g. pain	• Development of tolerance, psychological and physical dependence • Headache, irritability, confusion, memory impairment, depression, insomnia and tremor • Abrupt cessation may lead to withdrawal syndrome which can include insomnia, anxiety, perceptual hypersensitivity, tremors, irritability, nausea and vomiting, and even mental confusion and life-threatening convulsions

7.2 BARBITURATES

The barbiturates represent another group of synthetic CNS depressant drugs that were once widely used medically as hypnotics and sedatives. Their medical use today is limited to anti-epileptics or adjuncts to anaesthesia in surgical procedures and less commonly as anti-anxiety drugs. As with benzodiazepines, individual barbiturate drugs differ in the onset and duration of action and potency. Barbiturates have a low therapeutic index (a comparison of the amount which produces the therapeutic effect and that which results in toxicity) and overdosing can therefore be fatal. As a result, they have been largely replaced on both the licit and illicit market by the benzodiazepines.



Amobarbital



Phenobarbital

Common street names

Barbiturates in general	Amobarbital
Barbitos	Double trouble
Barbs	Rainbows
Candy	Reds and blues
Downers	
Goofballs	
Peanuts	
Sleepers	
Sleeping pills	

Pentobarbital	Secobarbital
Nimbies	Pinks
Yellow jackets	Red birds
	Red devils
	Reds
	Seggy

Currently, twelve barbiturates are subject to international control under different schedules of the Convention on Psychotropic Substances of 1971. Secobarbital is under Schedule II, amobarbital, butalbital, cyclobarbital and pentobarbital are under Schedule III, and the remaining barbiturates (e.g. allobarbital, barbital, butobarbital, methylphenobarbital, phenobarbital, secbutabarbital and vinylbital) are under Schedule IV.

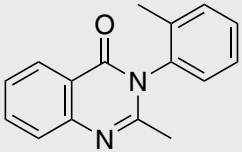
COMMON PHARMACEUTICAL BARBITURATES	DURATION OF ACTION
Amobarbital (Amytal®)	Intermediate (10-24 hours)
Pentobarbital (Nembutal®)	Short (<10 hours)
Phenobarbital (Luminal®)	Long (>24 hours)
Secobarbital (Seconal®)	Short (<10 hours)

Commonly used forms	Route of administration
White powders	Oral consumption
Capsules or tablets	Oral consumption
Liquid pharmaceutical preparations	Injection
Suppositories	Rectal

Mechanism of action and resulting effects

The depressant properties of barbiturates, from mild sedation to general anaesthesia, are derived from their activation of receptors in the $GABA_A$ receptor complex in the brain. Similarly to benzodiazepines, barbiturates enhance the action of GABA to produce their therapeutic effects.

Desired effects	Undesired acute effects	Effects of chronic use
• Relief of tension, mental stress and anxiety • Positive feelings of pleasure, calmness, relaxation and sociability • Improved coping with situational pressures or psychological problems	• Respiratory depression, weak and rapid heart rate, suppression of cough reflex • Drowsiness, potential stupor, unconsciousness, coma • Extreme, unpredictable emotional reactions and mental confusion, disorientation • Slurred speech, poor control of speech, impaired judgement • Loss of motor coordination, clumsiness, decreased self-control • Dilation of pupils	• Development of tolerance, strong physical and psychological dependence • Severe depression and amnesia • Bronchitis, pneumonia • Withdrawal may lead to irritability, nervousness, progressive restlessness, temporary sleep disturbances, faintness and nausea, anxiety, tremors, possible delirium and convulsions



Methaqualone

Common street names

714s
Quaalude
Lemons
Ludes
Mandrax
Parest

7.3 OTHER CNS DEPRESSANTS

Methaqualone

Methaqualone is a synthetic central nervous system (CNS) depressant with sedative-hypnotic, anticonvulsant, antispasmodic and local anaesthetic properties. It was withdrawn from the pharmaceutical market in many countries as a result of problems of abuse.

Methaqualone is under Schedule II of the Convention on Psychotropic Substances of 1971.

Commonly used forms	Route of administration
Brown, grey or black tacky powder	Nasal insufflation
Tablets or capsules	Oral consumption

Mechanism of action and resulting effects

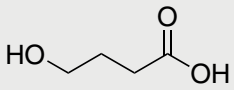
The sedative and hypnotic properties of methaqualone are mediated through its effect on GABA receptors in a similar manner to other CNS depressants.

Desired effects	Undesired acute effects and effects of chronic use
• Relief of tension, mental stress and anxiety • Relief of side effects associated with over-stimulation or withdrawal of other drugs (i.e. as part of a pattern of multiple drug use)	Similar to those of other CNS depressants, including reduction of mental activity, cardiac and respiratory depression as well as the development of tolerance, and psychological and physical dependence

gamma (γ)-hydroxybutyric acid (GHB)

GHB is a CNS depressant, which produces sedation and anaesthesia and is associated with drug-facilitated sexual assault. It is under Schedule II of the Convention on Psychotropic Substances of 1971.

GHB can be manufactured clandestinely from inexpensive ingredients and methods found on the Internet. It is also generated in the body after ingestion of the solvents *gamma*-butyrolactone (GBL) or 1,4-butanediol.



GHB

Medical use

Medically, GHB has been used as an adjunct in anaesthesia and as an aid to alcohol or opiate withdrawal. In addition, GHB (e.g. Xyrem®) has been used to treat insomnia and clinical depression [19].

Commonly used forms	Route of administration
Clear liquid (substance dissolved in water)	• Oral consumption • Injection
• White powder (as a salt) • Tablets or capsules	Oral consumption

Mechanism of action and resulting effects

The effects of GHB are mediated through its activation of a specific GHB receptor, which is excitatory, and its activation of the $GABA_B$ receptor, which has inhibitory properties. GHB has also been shown to affect the dopamine neurotransmitter system.

Desired effects	Undesired acute effects and effects of chronic use
• Similar to other CNS depressants: relaxation, reduced inhibition, euphoria and mild hallucinations • Promotes growth hormone effects of alleged stimulation of muscle growth	• Similar to those of other CNS depressants, including the development of psychological and physical dependence, and a withdrawal syndrome after discontinuation of prolonged use of large doses • Potential blackouts • In conjunction with other CNS depressants, adverse effects are exacerbated

Common street names

Cherry meth	GHB
Cloud-9	Liquid E
Fantasy	Liquid Ecstasy
G	Liquid X
Goop	Sleep
Georgia Home Boy	Scoop

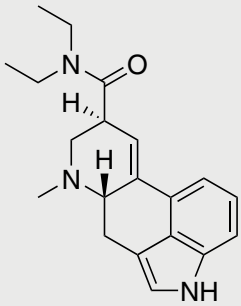
8. Hallucinogens

Hallucinogens are a diverse group of naturally occurring and synthetic drugs that induce distorted states of consciousness, perception, thinking and feeling, accompanied by different degrees of auditory or visual hallucinations. They are also referred to as “psychedelics”, which ultimately produce synaesthesia[6] [20] and altered perceptions of reality.

Hallucinogens fall into several chemically related groups, including tryptamine (e.g., (+)-lysergide [LSD] and psilocin), and phenethylamine (e.g., mescaline and 25B-NBOMe).

[6]Synaesthesia is an extraordinary condition in which senses that are usually experienced separately are combined, so that a person hearing a sound may see a colour as a result (e.g. hearing colours).

LSD tablets



LSD

8.1 (+)–LYSERGIDE (LSD)

LSD is a semi-synthetic drug derived from lysergic acid, an alkaloid found in a fungus, *Claviceps purpurea*, which grows on rye and other grains. LSD is one of the most potent hallucinogenic substances known and is listed in Schedule I of the Convention on Psychotropic Substances of 1971.

Commonly used forms	Route of administration
• Impregnated on paper (blotter papers) • Mini tablets (“microdots”) and capsules • Thin gelatine sheets (“window panes”)	Oral consumption

Mechanism of action and resulting effects

LSD has a complex pharmacology and its mechanism of action is not completely understood. It has affinity for a number of serotonin receptors and its hallucinogenic effects have been linked to its agonist activity at the 5-HT_{2A} receptor. LSD can have a duration of action as long as 10-12 hours [21].

The effects of LSD are extremely variable and strongly depend on the mental state of the user and the setting, i.e. the same dose in the same user may produce good and bad “trips”, depending on circumstances of use. Thus, the type of effects produced are subject to different confounding factors.

Desired effects	Undesired acute effects	Effects of chronic use
• Alterations in thought, mood and sensory perception, “mind expansion” • Sense of empathy, facilitation of communication and increased sociability	• Increased heart rate, profuse sweating • Distorted perception of depth, time, size and shape of objects, movements of stationary objects, intensified colours, sound and touch • Potential anxiety, depression, dizziness, disorientation and paranoia • Dilation of pupils, decreased body temperature, nausea and vomiting • Convulsions may occur	• Potential prolonged anxiety and depression • Rapid development of tolerance • “Flashbacks” (i.e. short-lived, vivid re-experiences of part of a previous trip) can occur days or even months after taking the last dose, leading to disorientation and distress • Physical dangers attributable to long-term LSD use are not known

LSD tablets

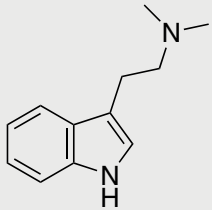
Common street names

Hippie
Acid
Blotter

8.2 TRYPTAMINES

Hallucinogenic tryptamines are a group of substances, which are related to both LSD and psilocybin in their structure and action. Several tryptamines occur naturally in a variety of plants, fungi or animals, and have a history of use as hallucinogenic snuffs or drinks, for example, in the Amazon forest and the Caribbean. They can also be manufactured through chemical synthesis.

There are three tryptamines under international control: diethyltryptamine (DET), dimethyltryptamine (DMT) and etryptamine, which are in Schedule I of the Convention on Psychotropic Substances of 1971. Currently, no tryptamines are approved for medical use.



Dimethyltryptamine

Common street names

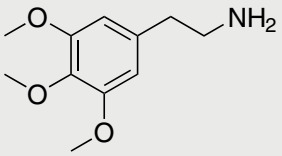
Businessman's LSD
Businessman's lunch trip

Commonly used forms	Route of administration
Dark brown solid material (crude plant preparation)	Inhalation
Powder	Nasal insufflation
Oily liquid	Injection
Tablets, capsules	Oral consumption—if tryptamines are in tablet or capsule form. However, they are rarely consumed orally

Mechanism of action and resulting effects

Tryptamines share a similar mode of action to LSD and act as non-selective serotonin receptor agonists. The impairment of coordination following their use is frequently more pronounced than that produced by LSD. Their effects are very dose dependent, and their duration of action can be extremely short (a few minutes), particularly when smoked.

A peyote cactus



Mescaline

8.3 PLANT-BASED HALLUCINOGENS

Peyote cactus and mescaline

Mescaline is the main psychoactive component of the peyote cactus (*Lophophora williamsii*). The mescaline content in peyote varies depending on environmental factors (temperature, rainfall, altitude) and soil conditions and can range from 0.7–3.5 per cent of the dried weight. Mescaline can also be synthesized clandestinely and is under Schedule I of the Convention on Psychotropic Substances of 1971.

Commonly used forms	Route of administration
Dried, sliced and chopped in the form of a button (mescal button)	Oral consumption (chewed, or soaked in water to produce an intoxicating liquid)
Ground button of the cactus, in capsules	Oral consumption
Powder, in capsules or tablets	Inhalation

Mechanism of action and resulting effects

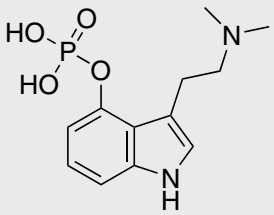
The mechanism of action of mescaline is similar to other hallucinogens and its effects are mediated through its interaction with serotonin receptors (e.g. 5-HT_{2A}). Mescaline is less potent than LSD but its effects can last up to 10-12 hours.

Desired effects	Undesired acute effects
Alterations in thought, mood and sensory perception	• Unlike LSD, the effects of mescaline include euphoria, hilarity and prominent signs of physiological arousal, such as increased heart rate and blood pressure, dilation of pupils, nausea, vomiting and stomach pains. • Euphoria and detachment from surroundings • Visual distortions progress to vivid hallucinations of colour and movement

Common street names

Mescaline	Mescal button
Big chief	Buttons
Mesc	Peyote
Moon	Peyotl

Dried psilocybin mushrooms



Psilocybin

Psilocybin is under Schedule I of the Convention on Psychotropic Substances of 1971.

Common street names

Divine flesh	Sacred mushrooms
Hombrecitos	Shrooms
Magic mushrooms	Teonanácatl

Psilocybe mushrooms and psilocybin

Psilocybin is the naturally occurring, hallucinogenic substance primarily found in the *Psilocybe mexicana* mushroom although there are more than 75 species of mushrooms from the genera *Psilocybe*, *Panaeolus* and *Conocybe* that can contain psilocybin. The psilocybin content of *Psilocybe* mushrooms can vary from between 0.2–2 per cent [22].

Commonly used forms	Route of administration
Intact dried brown mushrooms	• Oral consumption (swallowed raw, cooked, or brewed into a beverage) • Intravenous injection (of extracts, occurs rarely)
Crude mushroom preparation	
Powdered material in capsules	

Mechanism of action and resulting effects

Following ingestion of mushrooms containing psilocybin, the psilocybin is converted into its more active metabolite psilocin, and the hallucinogenic effects are mediated through its action as a serotonin receptor agonist similar to other hallucinogens. The duration of action is typically 4–6 hours.

Desired effects	Undesired acute effects
Alterations in thought, mood and sensory perception	• Physical effects include muscle weakness, drowsiness and lack of coordination • Fatal poisoning may occur due to mistaken identity of mushrooms • Tolerance may develop

8.4 SYNTHETIC HALLUCINOGENS

There are a number of synthetic substances which act in a similar way to the plant-based hallucinogens. These substances are in general structurally similar to mescaline (a phenethylamine) and amphetamine/methamphetamine. Their predominant effects are hallucinatory, but some of the substances can also have stimulatory effects [23]. This group includes substances such as DOB (brolamfetamine), 2C-B and 25I-NBOMe. None of the substances in this group are approved for medical use.

Common substances

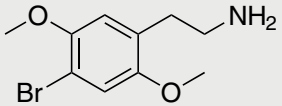
25I-NBOMe (2-(4-iodo-2,5-dimethoxyphenyl)-*N*-(2-methoxybenzyl)ethanamine)

2C-B (4-bromo-2,5-dimethoxyphenethylamine)

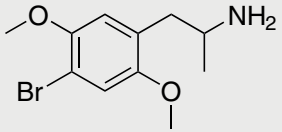
DOB (Brolamfetamine)

STP/DOM (2,5-dimethoxy-4-methylamphetamine)

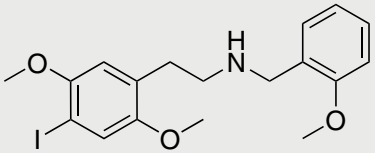
TMA (3,4,5-trimethoxyamphetamine)



2C-B



DOB



25I-NBOMe

2C-B is a phenethylamine with hallucinogenic properties [24] that became popular during the mid-1980s. 2C-B is in Schedule II of the Convention on Psychotropic Substances of 1971.

DOB is a highly potent phenethylamine with hallucinogenic effects. It was a popular drug of abuse in the 1980s with effects lasting longer than those of 2C-B. DOB is in Schedule I of the Convention on Psychotropic Substances of 1971.

The NBOMe series are a group of synthetic hallucinogens that are derivatives of the “2C series” of substances and are often sold as LSD. These substances vary in potency, pharmacological effects and toxicity, and as such errors in dosage may have fatal consequences [25]. As with LSD, NBOMe substances are commonly sold on blotter paper, yet in contrast to LSD, they are accompanied by a bitter taste. 25B-NBOMe, 25C-NBOMe, and 25I-NBOMe, are in Schedule II of the Convention on Psychotropic Substances of 1971.

Common street names

DOB
STP: Serenity, Tranquillity, Peace

2C-B
Venus
Bromo
Erox
Bees
Nexus

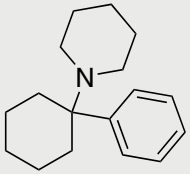
25I-NBOMe
25I
BOM-25
BOMCI
Cimbi-5
Dots
Legal acid
N-boom
NBomb
NE-BOME
Smiles
Smiley paper
Solaris

Commonly used forms	Route of administration
DOB	
White to off-white powders	• Nasal insufflation (occasionally) • Injection (rarely)
Tablets and capsules	Oral consumption
Impregnated on paper	Oral consumption
2C-B	
Powder	Nasal insufflation
Tablet	Oral consumption
25B-NBOMe, 25C-NBOMe, and 25I-NBOMe	
Finely ground powder	• Nasal insufflation • Inhalation (vaporizer)
Tablet	Oral consumption
Liquid	• Intravenous and intramuscular injection • Nasal insufflation (of liquid)
Blotter paper	Oral consumption
Blotter into gel capsule or suppository	Rectal

Mechanism of action and resulting effects

Synthetic hallucinogens have a similar pharmacological profile to that of LSD and other plant-based hallucinogenic substances. They act, to varying extents, at the 5-HT_{2A} receptor (e.g., 2C-B acts as a partial agonist, while 25I-NBOMe is a potent full agonist). The potency and duration of action of the individual substances depends on a number of factors including the chemical substituents present.

Desired effects	Undesired acute effects	Effects of chronic use
• Alterations in thought, mood and sensory perception Mental and physical stimulation	• Changes in body temperature (sweating or chills) • Nausea, vomiting • Muscle twitching, tension • Confusion and difficulty focusing • Insomnia • Paranoia, fear and panic • Unpleasant visions, unwanted and overwhelming feelings • Visual and auditory hallucinations • Dilation of pupils • General change in consciousness • Unusual body sensations (facial flushing, chills, goose bumps, body energy) • Slight increase in heart rate • Vasoconstriction, peripheral numbness, swelling of feet, hands or face • Change in perception of time, time dilation • Looping, recursive out of control thinking • Scrambled communication • Unwanted life-changing spiritual experiences	• Risk of neurological damage, such as progressive encephalopathy and muscle weakness in the limbs (“quadriparesis”) • Increased heart rate, high blood pressure, exceptionally high fever • Excessive acid in blood • Seizures, involuntary, muscular contractions and relaxations in rapid succession • Rapid destruction of muscle tissue • Acute kidney injury • Potential violent, erratic behaviour, agitation and aggression • Further effects are not yet known, but are potentially similar to those of LSD



PCP

Common street names

Angel dust
DOA (dead on arrival)
Hoy
Killer weed
Magic dust
Peace pills
Rocket fuel
Space basing (PCP with crack)

8.5 PHENCYCLIDINE (PCP)

Phencyclidine is a synthetic drug with anaesthetic and hallucinogenic properties. PCP was investigated in the 1950s for its anaesthetic potential, but was withdrawn from the pharmaceutical market due to its severe side effects. PCP is under Schedule II of the Single Convention on Narcotic Drugs of 1961.

Commonly used forms	Route of administration
White to grey or brown crystalline powder or gummy mass	Nasal insufflation
Tablets or capsules	Oral consumption
Liquid	Inhalation—often applied to leafy material

Mechanism of action and resulting effects

PCP is a dissociative anaesthetic with hallucinogenic properties. In contrast to LSD, the hallucinogenic properties of PCP are a result of its action as an NMDA (*N*-methyl-D-aspartate) receptor antagonist. In addition, PCP has stimulant properties as it inhibits the reuptake of dopamine, norepinephrine and serotonin, thus intensifying the effect of these neurotransmitters.

Desired effects	Undesired acute effects	Effects of chronic use
• Alterations in thought, mood and sensory perception • Out-of-body experiences • Changes in body awareness, feelings of detachment and distance	• Loss of comprehension of the immediate environment, often accompanied by a sense of strength and invulnerability • Hallucinations, image distortion, severe mood disorders, mental confusion, amnesia • Potential acute anxiety, paranoia and violent hostility, or schizophrenia-like psychoses • Numbness of the extremities, slurred speech and loss of coordination • Shallow respiration, increased rate of breathing, blood pressure and heart rate, flushing and profuse sweating, blank stare, rapid and involuntary eye movements, watering of eyes • Potential convulsions, coma	• Development of tolerance and strong psychological dependence • "Flashbacks" (i.e. short-lived, vivid re-experiences of part of a previous trip) can occur days or even months after taking the last dose, leading to disorientation, anxiety and distress • Impaired memory • Speech difficulties (e.g. stuttering or the inability to speak)

Glossary of Terms

Most definitions are based on those given in the *Lexicon of Alcohol and Drug Terms* (Geneva, 1994) of the World Health Organization (WHO). These terms have been adapted where necessary and cross-references are provided in *italics*.

ABUSE	Due to the ambiguity of the term "abuse", the WHO Lexicon has replaced this term with "harmful use" and "hazardous use", which is defined as follows: **Harmful use** is a pattern of psychoactive substance use that is causing damage to health, physical (e.g. hepatitis following injection of drugs) or mental (e.g. depressive episodes secondary to heavy alcohol intake). Harmful use commonly, but not invariably, has adverse social consequences. The term was introduced in ICD-10 and supplanted "non-dependent use" as a diagnostic term. **Hazardous use** is a pattern of substance use that increases the risk of harmful consequences for the user. In contrast to harmful use, hazardous use refers to patterns of use that are of public health significance despite the absence of any current disorder in the individual user. In the context of international drug control, drug abuse constitutes the use of any substance under international control outside therapeutic indications, in excessive *dose* levels, or over an unjustified period of time.
ABUSE LIABILITY	The propensity of a particular psychoactive substance to be susceptible to abuse, defined in terms of the relative probability that use of the substance will result in social, psychological and physical problems for an individual or for society.
ACUTE EFFECT	Effects produced by a single *dose* or a short period of continuous administration of a drug.
ADDICTION	The terms "addiction" and "habituation" were abandoned by WHO in 1964 in favour of *drug dependence*. However, since those terms are still widely used, below is a definition of "addiction". "Addiction" refers to the repeated use of a psychoactive substance or substances, to the extent that the user is periodically or chronically intoxicated, shows a compulsion to take the preferred substance (or substances), has great difficulty in voluntarily ceasing or modifying substance use, and exhibits determination to obtain psychoactive substances by almost any means.
ADJUNCT	An additional drug, substance or procedure that is used to strengthen or increase the efficacy of the initial treatment.
ADULTERANTS	A substance that is added to a drug to increase the quantity produced, enhance the pharmacological and psychoactive effect, or facilitate the administration of the drug. Adulterants may include sugars, caffeine, lidocaine or paracetamol. However, other adulterants may be more harmful, particularly when administered through injection.

ADVERSE DRUG REACTION	In the general medical and pharmacological fields, "adverse drug reaction" denotes a toxic physical or (less common) psychological reaction to a therapeutic agent. The reaction may be predictable, or allergic or idiosyncratic (unpredictable). In the context of drug *abuse*, the term includes unpleasant psychological and physical reactions to drug taking.
AGONIST	A substance that acts at a neuronal receptor to produce effects similar to those of a reference drug. For example, methadone is a morphine-like agonist at the opioid receptors. Full agonist is a substance that produces a full response or the maximum effect at a given receptor. Partial agonist is a substance that produces a reduced response as it is unable to elicit the maximum effect or response.
ANALGESIC	A substance that reduces pain and may or may not have psychoactive properties.
ANTAGONIST	A substance that counteracts the effects of another agent. Pharmacologically, an antagonist interacts with a receptor to inhibit the action of agents (agonists) that produce specific physiological or behavioural effects mediated by that receptor.
ANTIDEPRESSANT	Any of a group of psychoactive agents prescribed for the treatment of depressive disorders; also used for certain other conditions such as panic disorder. There are three main classes: *(a)* tricyclic antidepressants, *(b)* serotonin receptor agonists and uptake blockers, and *(c)* monoamine oxidase inhibitors. None of the common antidepressants is under international control.
BLOOD-BRAIN BARRIER	A network of blood vessels that separates the brain from the circulatory system (blood) and acts as a protective layer of the central nervous system (CNS), restricting the passage of certain harmful substances, while enabling that of necessary substances.
CENTRAL NERVOUS SYSTEM (CNS)	The CNS is a part of the nervous system, which comprises the brain and spinal cord, and is responsible for most functions of the body, including processes under voluntary and involuntary control. Functions range from breathing and blinking, which are involuntary processes, to speaking and walking, which are voluntary processes, and to emotions and perceptions. Within the CNS, the brain stores, processes and interprets sensory information and the spinal cord acts as the bridge between the brain and peripheral nerves by relaying signals to the rest of the body through the peripheral nervous system (PNS).
CHRONIC USE	Prolonged, continuous, frequent, long-term or heavy use of a substance over a certain period of time, leading to severe adverse health effects.

INTERNATIONAL DRUG CONVENTIONS	The three main international drug conventions are: **Single Convention on Narcotic Drugs of 1961 as amended by the 1972 Protocol** establishes an international control system for narcotic drugs. **Convention on Psychoactive Substances of 1971** establishes an international control system for psychotropic substances. **United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances of 1988**, which provides comprehensive measures against drug trafficking, including provisions against money-laundering and the diversion of precursor chemicals.
SUBSTANCES under INTERNATIONAL CONTROL	Refers to substances listed in the schedules (for the 1961 and 1971 Conventions) and tables (for the 1988 Convention) which are annexed to these conventions.
(DRUG) DEPENDENCE	The term was introduced in 1964 by a WHO Expert Committee to replace *addiction* and habituation. "Drug dependence" comprises a cluster of physiological, behavioural and cognitive phenomena of variable intensity, in which the use of a psychoactive drug (or drugs) takes on a high priority. It implies a need for repeated doses of the drug and indicates that a person has impaired control of substance use, as its use is continued despite adverse consequences. **PSYCHOLOGICAL or PSYCHIC DEPENDENCE** refers to the experience of impaired control over drug use. **PHYSIOLOGICAL or PHYSICAL DEPENDENCE** involves the development of *tolerance* and withdrawal symptoms upon cessation of use of the drug, as a consequence of the body's adaptation to the continued presence of a drug.
DOSE	A dose is the quantity of a substance, which is required to elicit the desired response in the individual, both in medicine and for abuse purposes. This dose will vary depending on a number of factors, including the particular substance, its form, the route of administration, and the drug consumption history of the individual. Doses are therefore highly dependent on various effects, including past drug experiences, individual differences in weight and size and whether a drug is taken in combination with other substances (e.g. poly-drug use). Average doses are not generalizable or applicable to every person. Differences in the purity, potency and concentration of substances has implications on dosages and the amount that is consumed by an individual. For example, substances with high potency may require small doses, to produce similar pharmacological effects. While some substances are effective in milligrams or grams, others may exert their effect with as little as a few micrograms (1 microgram is equal to 0.000001 grams).

	Additional confounding factors exist that make accurate ranges of dosing information equivocal. There is a lack of information about social behaviour and drug consumption patterns are highly variable, which in turn makes the level of use inexact. Data on average doses can therefore only provide certain estimates of use, which does not accurately reflect consumption patterns. In certain cases, the "defined daily doses" used by the International Narcotics Control Board (INCB) for narcotic drugs and psychotropic substances, which is available in their technical reports, may provide further guidance. Drugs or substances that are used repeatedly over time can lead to the development of tolerance. During tolerance the body does not respond to the substance at the same dosage and therefore, higher amounts of the substance are required to achieve the desired effect.
DRUG	In the context of international drug control, "drug" means any of the substances in Schedule I and II of the 1961 Convention, whether natural or synthetic. A term of varied usage. In medicine, it refers to any substance with the potential to prevent or cure disease or enhance physical or mental welfare; in pharmacology it means any chemical agent that alters the biochemical or physiological processes of tissues or organisms.
DRUG TESTING	The identification and chemical analysis of drugs in seized material and biological specimens, i.e. body fluids (urine, blood, saliva), hair, or other tissue, in order to assess the presence of one or more psychoactive substances.
ENTACTOGEN (or EMPATHOGEN)	Term derived from the Greek "en" (inside) and "gen" (to induce) and the Latin "tactus" (tact). It describes a condition that allows users to "make contact" with their own feelings and those of others. Examples of controlled drugs include MDMA ("ecstasy").
HYPERTHERMIA	An abnormally high body temperature.
HYPNOTIC	Any of a group of central nervous system depressants with the capacity to induce sleep. Major classes of sedatives/hypnotics include the benzodiazepines and barbiturates. See also *sedative*.
ILLICIT TRAFFIC	The manufacture, cultivation or trafficking in drugs or psychotropic substances contrary to the provisions of the Conventions.
LICIT DRUG	A drug that is legally available by medical prescription in the jurisdiction in question, or, sometimes, a drug legally available without medical prescription.

NARCOTIC DRUG	In the context of international drug control, "narcotic drug" means any of the substances, natural or synthetic, in Schedules I and II of the Single Convention on Narcotic Drugs, 1961, and that Convention as amended by the 1972 Protocol Amending the Single Convention on Narcotic Drugs, 1961. In medicine, a chemical agent that induces stupor, coma or insensibility to pain (also called narcotic *analgesic*). The term usually refers to opiates or opioids, which are also named narcotic analgesics. In common parlance and legal usage, it is often used imprecisely to mean illicit drugs, irrespective of their pharmacology.
NEUROLEPTIC	Any of a group of drugs used for the treatment of acute and chronic psychoses. Also known as major tranquillizers and antipsychotics. Neuroleptics have low abuse potential.
NEUROTRANSMITTER	A chemical messenger that is endogenous to the body and transmits signals between neurons to enable a form of communication between individual cells or neurons in the body. Dopamine, norepinephrine (or noradrenaline) and serotonin are examples of neurotransmitters.
OVERDOSE	The use of any drug in such an amount that acute adverse physical or mental effects are produced. Overdose may produce transient or lasting effects, or death; the lethal dose of a particular drug varies with the individual and with circumstances. See also: intoxication; poisoning.
PHARMACEUTICAL DRUGS	Drugs manufactured by the pharmaceutical industry or made up by a pharmacist. Industry terminology categorizes drugs as ethical drugs, available only on prescription, and over-the-counter or proprietary drugs, advertised to the consumer and sold without prescription. The list of drugs requiring prescription varies considerably from country to country; most psychoactive pharmaceuticals are only available by prescription in industrialized countries.
PHARMACOLOGY	"Pharmacology" is the science of drugs, including their sources, appearance, chemical composition, properties, biological actions and therapeutic uses. It also covers allied fields such as *toxicology* and *posology* (see definition below).
POSOLOGY	"Posology" is the study of dosage and is an important division of *pharmacology*. Knowledge of the dose of commonly used drugs is essential for acquiring confidence in prescribing.
PSYCHEDELIC	The distinct feature of "psychedelic" drugs is their capacity to induce states of altered perception, thought and feeling that are not experienced otherwise except in dreams or at times of religious exaltation; they can, but not necessarily, produce overt hallucinations.

PSYCHOTROPIC or PSYCHOACTIVE SUBSTANCE	Any chemical agent affecting the mind or mental processes (i.e. any psychoactive drug). In the context of international drug control, "psychotropic substance" means any substance, natural or synthetic, or any natural material in Schedule I, II, III or IV of the 1971 Convention.
RECEPTOR	A protein structure, embedded in cell membranes, which enables the binding and movement of substances such as drugs, hormones or neurotransmitters and thus is involved in conveying cellular signals. Receptors are named after the type of neurotransmitter that they preferentially bind to, for instance, dopamine receptors.
ROUTE of ADMINISTRATION	The way in which a substance is introduced into the body, such as oral ingestion, intravenous (IV), subcutaneous or intramuscular injection, inhalation, smoking, or absorption through skin or mucosal surfaces, such as the gums, rectum or genitalia. This process determines the rate at which a substance is absorbed into the bloodstream. The following are some common routes of administration described in this publication: **ORAL CONSUMPTION** refers to the administration of the substance using the mouth. Tablets or capsules are swallowed and substances are ingested and broken down into metabolites through the digestive system. These forms pass the intestines and only once dissolved are they able to cross the mucosal membranes in order to reach the bloodstream, pass the blood brain barrier and produce effects. Given the length of time needed for these processes to occur, substances administered orally have a slower onset but have a longer duration of effects. There is a dose-dependent mechanism of some drugs, in which a higher dose results in a longer duration of effects, thus making it difficult to quantify precisely. **Buccal** refers to the placement of a substance into the mouth until it is dissolved. **Sublingual** refers to the placement of a substance underneath the tongue until it is dissolved. **INJECTION** refers to the administration of a drug through the skin using a syringe or any other injection tools. This route poses a serious public health risk as infectious diseases such as HIV or hepatitis can be passed from person to person through the sharing of injection equipment. Three methods of injection exist, namely intramuscular, intravenous (IV) or subcutaneous injections. **Intramuscular** is an injection through the muscle, which is the slowest method of drug delivery throughout the body. **Intravenous (IV)** is an injection through the veins, and also the fastest distribution, as the drug is inserted directly into the bloodstream.

ROUTE of ADMINISTRATION *(continued)*	**Subcutaneous** is an injection immediately under the skin, which is a relatively slow method of delivery. **NASAL INSUFFLATION** refers to the consumption of a drug through snorting or sniffing its powder, or liquid, form. Onset is almost immediate, as the drug particles are able to cross the mucosal membranes within the nose and close to the brain. **RECTAL** refers to the administration of a drug through the rectum with the use of suppositories. Suppositories are capsules that contain the substance powder, which can be easily administered rectally. The onset of effects is delayed as the capsule may take time to dissolve causing a delay of the absorption of the substance into the bloodstream.
SEDATIVE	Any of a group of central nervous system depressants with the capacity of relieving anxiety and inducing calmness. Major classes of *sedatives/hypnotics* include the benzodiazepines and barbiturates. See also *hypnotic*.
SIDE EFFECTS	See *adverse drug reaction*.
STIMULANT	In reference to the *central nervous system* (CNS), any agent that activates, enhances or increases neural activity; also called psychostimulants or CNS stimulants. Included are amphetamine-type stimulants, cocaine, caffeine, nicotine, etc. Other drugs have stimulant actions which are not their primary effect but which may be manifest in high doses or after chronic use.
TOLERANCE	A decrease in response to a drug *dose* that occurs with continued use, i.e. increased drug doses are required to achieve the effects originally produced by lower doses.
TOXICOLOGY	"Toxicology" is the science of substances as causes of *side effects* and disease in man, including their sources, appearance, chemical composition, properties, biological actions, detection and methods of treatment (antidotes). See also *pharmacology*.
TRANQUILLIZER	A tranquillizer is a calming agent. The term can be used to differentiate between these drugs and the *sedative/hypnotics*: tranquillizers have a quieting or damping effect on psychomotor processes without—except at high doses—interference with consciousness or thinking.
WITHDRAWAL SYNDROME	A group of symptoms of variable clustering and degree of severity which occur on cessation or reduction of use of a psychoactive substance that has been taken repeatedly, usually for a prolonged period and/or in high doses.

References

REFERENCES

1. Commission on Narcotic Drugs (CND), *Notes by the Secretariat on the challenges and future work in the review of substances for possible scheduling recommendations* 2014.
2. United Nations Office on Drugs and Crime (UNODC), *The International Drug Control Conventions* 2013.
3. Tsumura, Y., R. Aoki, Y. Tokieda, M. Akutsu, Y. Kawase, T. Kataoka, T. Takagi, T. Mizuno, M. Fukada, and H. Fujii, "A survey of the potency of Japanese illicit cannabis in fiscal year 2010". *Forensic Science International*, 2012. 221(1): p. 77-83.
4. Niesink, R.J., S. Rigter, M.W. Koeter, and T.M. Brunt, "Potency trends of Δ9-tetrahydrocannabinol, cannabidiol and cannabinol in cannabis in the Netherlands: 2005-15". *Addiction*, 2015.
5. Galli, J.A., R.A. Sawaya, and F.K. Friedenberg, "Cannabinoid hyperemesis syndrome". *Current Drug Abuse Reviews*, 2011. 4(4): p. 241-9.
6. Hopkins, C.Y. and B.L. Gilchrist, "A case of cannabinoid hyperemesis syndrome caused by synthetic cannabinoids". *Journal of Emergency Medecine*, 2013. 45(4): p. 544-6.
7. Wills, S., *Drugs of Abuse*. 2005: Pharmaceutical Press.
8. Robertson, J.P., "Clarke's Analysis of Drugs and Poisons 3rd Edition [Book Review]". *Australian Journal of Forensic Science*s, The. 36(2): p. 85.
9. Strang, J., T. Groshkova, A. Uchtenhagen, W. van den Brink, C. Haasen, M.T. Schechter, N. Lintzeris, J. Bell, A. Pirona, and E. Oviedo-Joekes, "Heroin on trial: systematic review and meta-analysis of randomised trials of diamorphine-prescribing as treatment for refractory heroin addiction". *The British Journal of Psychiatry*, 2015. 207(1): p. 5-14.
10. World Health Organization (WHO). *WHO Model Lists of Essential Medicines* 2015 [cited 2015 May]; Available from: http://www.who.int/medicines/publications/essentialmedicines/en/.
11. World Health Organization (WHO), *Guidelines for the psychosocially assisted pharmacological treatment of opioid dependence* 2009.
12. European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). *Drug Profile Pages* 2015 [cited 2015 April]; Available from: http://www.emcdda.europa.eu/drug-profiles.
13. Chong, C.A. and N.M. Denny, "Local anaesthetic and additive drugs". *Anaesthesia & Intensive Care Medicine*, 2004. 5(5): p. 158-161.
14. World Health Organization (WHO), *Amphetamine-type stimulants: a report from the WHO Meeting on Amphetamines, MDMA and other Psychostimulants, Geneva, 12-15 November 1996,* 1997.
15. Heal, D.J., S.L. Smith, J. Gosden, and D.J. Nutt, "Amphetamine, past and present—a pharmacological and clinical perspective". *Journal of Psychopharmacology*, 2013. 27(6): p. 479-96.
16. de la Torre, R., M. Farre, P.N. Roset, N. Pizarro, S. Abanades, M. Segura, J. Segura, and J. Cami, "Human pharmacology of MDMA: pharmacokinetics, metabolism, and disposition". *Therapeutic Drug Monitoring*, 2004. 26(2): p. 137-44.

17. Rietjens, S.J., L. Hondebrink, R.H. Westerink, and J. Meulenbelt, “Pharmacokinetics and pharmacodynamics of 3,4-methylenedioxymethamphetamine (MDMA): interindividual differences due to polymorphisms and drug-drug interactions”. *Critical Reviews in Toxicology*, 2012. 42(10): p. 854-76.
18. World Health Organization (WHO), *Lexicon of Alcohol and Drug Terms* 1994.
19. Muse, M. and B.A. Moore, *Handbook of Clinical Psychopharmacology for Psychologists*. 2012: John Wiley & Sons.
20. World Health Organization (WHO), *Neuroscience of psychoactive substance use and dependence* 2004.
21. Nichols, D.E., “Hallucinogens”. *Pharmacology & therapeutics*, 2004. 101(2): p. 131-181.
22. United Nations Office on Drugs and Crime (UNODC), *Recommended Methods for the Detection and Assay of Lysergide (LSD), Phencyclidine (PCP), Psilocybin and Methaqualone in Biological Specimens*. 1999 (ST/NAR/31).
23. Rickli, A., D. Luethi, J. Reinisch, D. Buchy, M.C. Hoener, and M.E. Liechti, “Receptor interaction profiles of novel N-2-methoxybenzyl (NBOMe) derivatives of 2, 5-dimethoxy-substituted phenethylamines (2C drugs)”. *Neuropharmacology*, 2015. 99: p. 546-553.
24. Carmo, H., J.G. Hengstler, D. De Boer, M. Ringel, F. Remião, F. Carvalho, E. Fernandes, L.A. Dos Reys, F. Oesch, and M. de Lourdes Bastos, “Metabolic pathways of 4-bromo-2, 5-dimethoxyphenethylamine (2C-B): analysis of phase I metabolism with hepatocytes of six species including human”. *Toxicology*, 2005. 206(1): p. 75-89.
25. World Health Organization (WHO), *Critical Review of Psychoactive Substances (AH-7921, 25B-NBOMe, 25C-NBOMe, 25I-NBOMe, Mephedrone, N-Benzylpiperazine, JWH-018, AM-2201, MDPV and Methylone)* 2014.

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