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NPS CLASSIFICATION - PART I

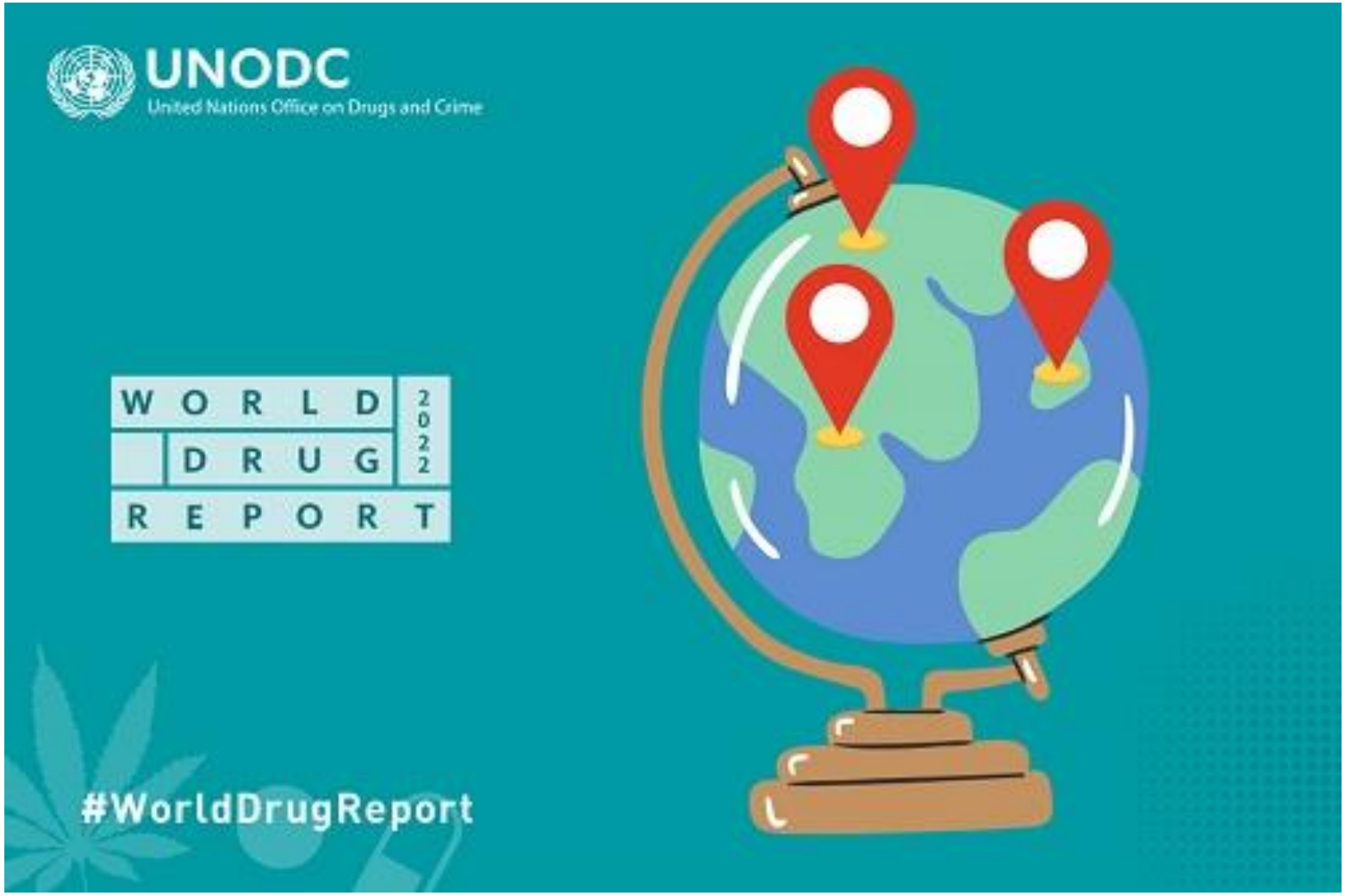
«CLASSICAL» SUBSTANCES OF ABUSE

Assoc. Prof. Laura Mercolini, Assoc. Prof. Roberto Mandrioli

Ines.unibo.it
2021-1-IT02-KA220-SCH-000032570 - Strategic Partnership supporting innovation – School Education
[project duration: 2021-2024]

SUBSTANCES OF ABUSE

drug addiction



World Drug Report, United Nations Office on Drugs and Crime, 2022

SUBSTANCES OF ABUSE

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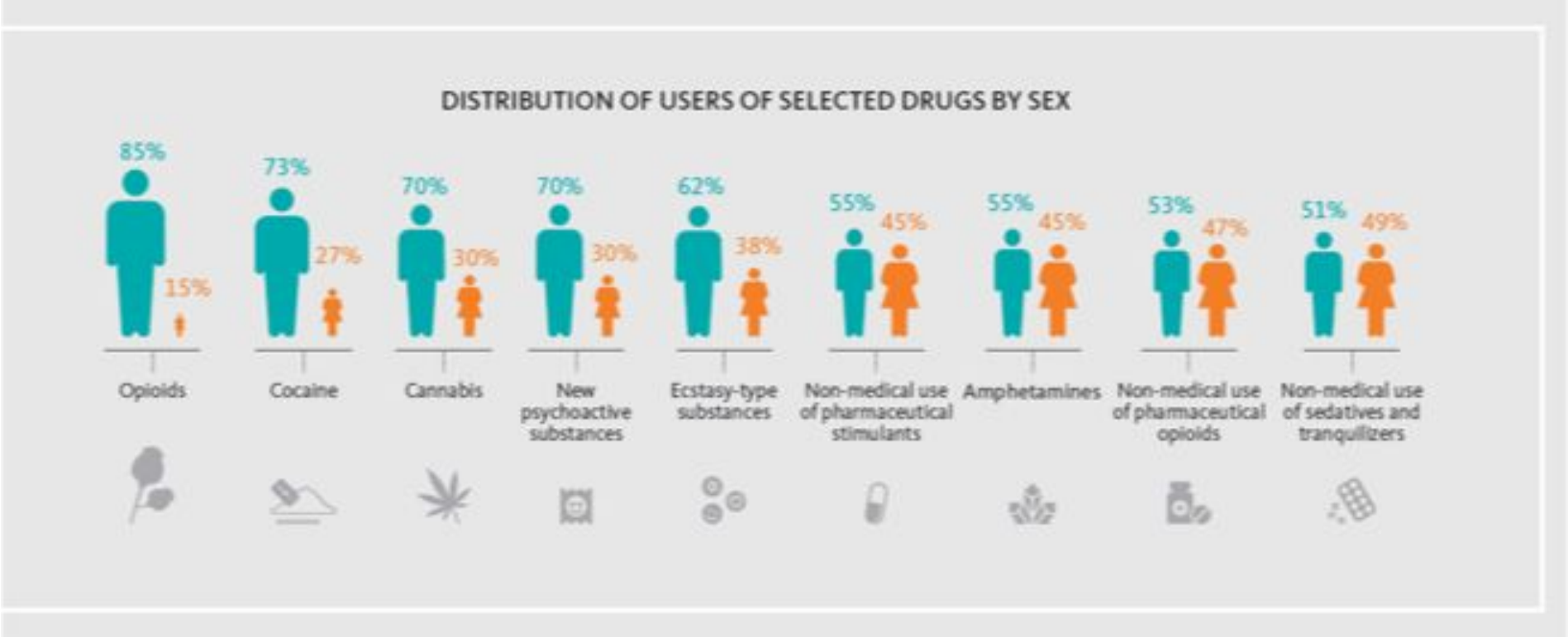

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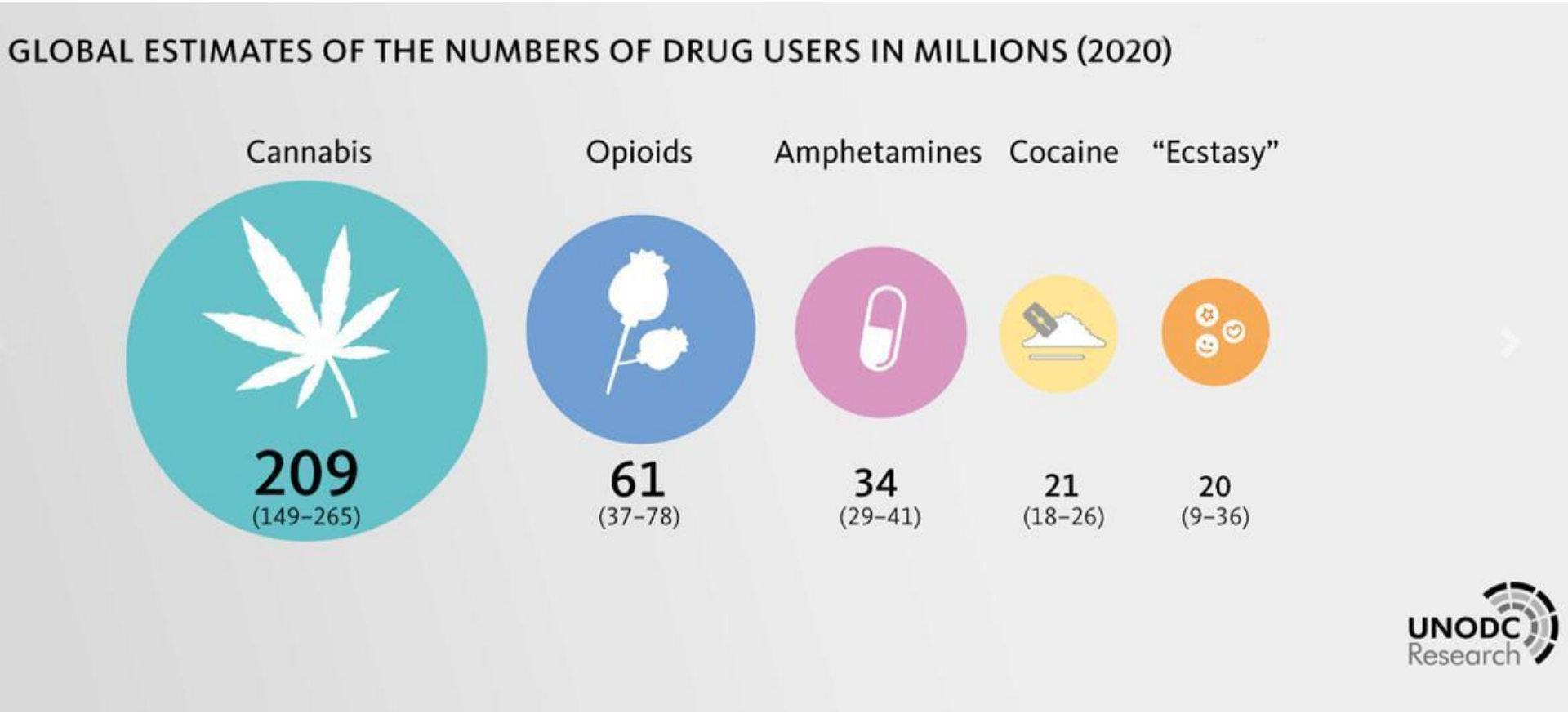

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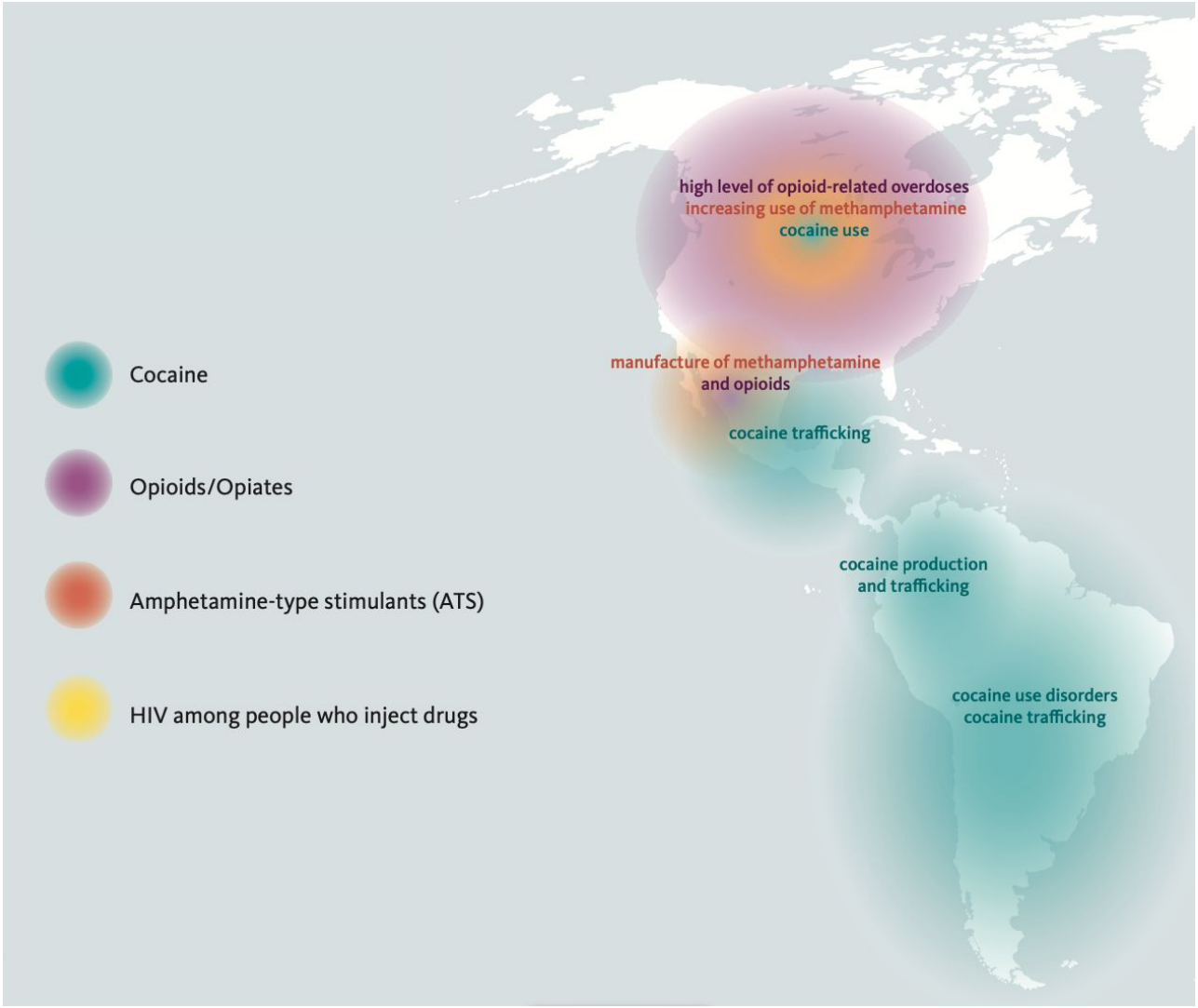

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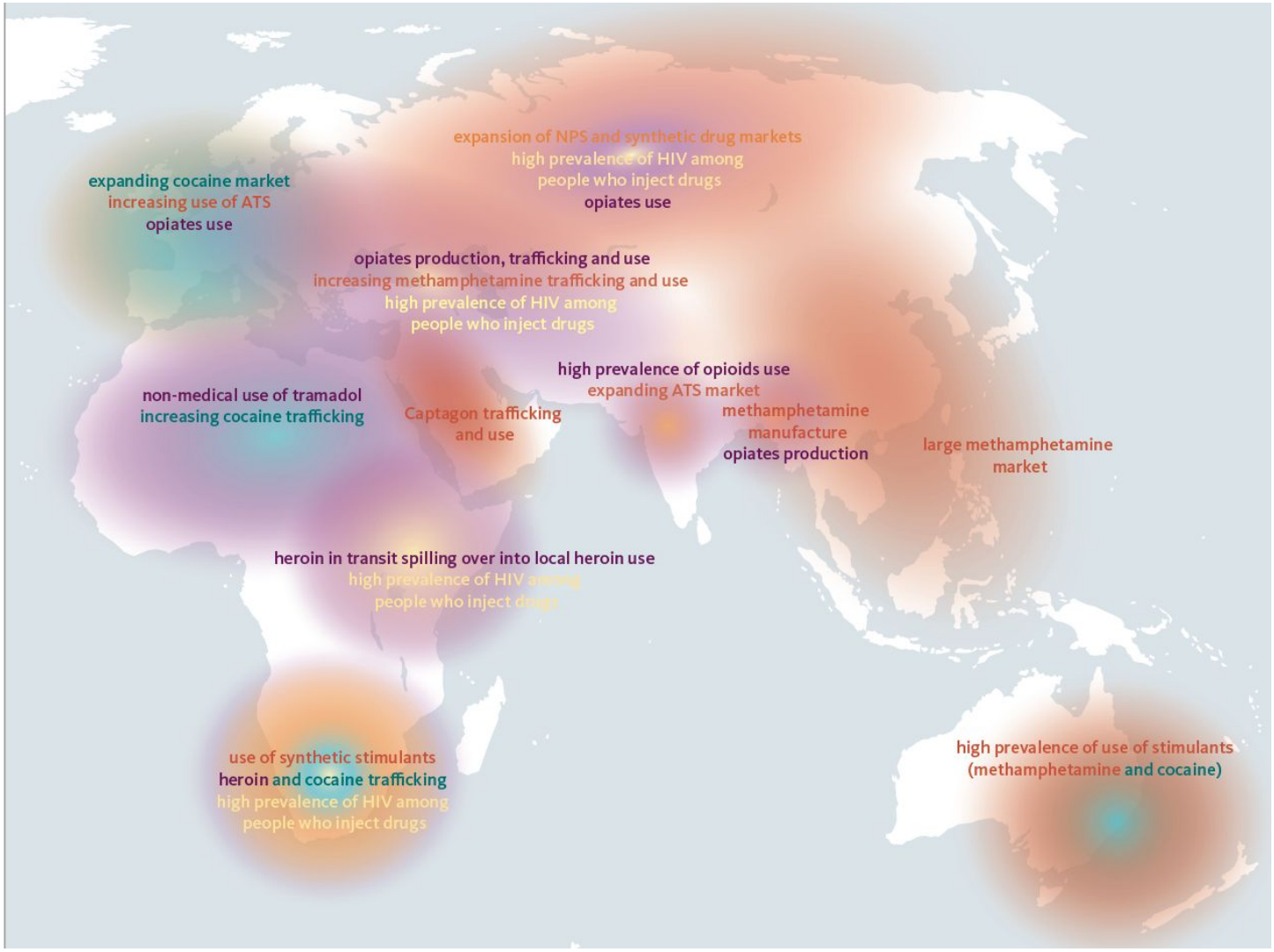
SUBSTANCES OF ABUSE

drug addiction



World Drug Report, United Nations Office on Drugs and Crime, 2022

CANNABINOIDS

psychoactive compounds from *Cannabis* spp.

Main illicit preparations:

MARIJUANA

Mixture of different, dried and ground plant parts (mainly flowers)

HASHISH

Resin extracted from the plant's flowering buds

Δ^9-Tetrahydrocannabinol (Δ^9-THC)

Most potent psychoactive cannabinoid

Optimal absorption: inhalation

Consumption by smoking

MAIN EFFECTS OF CANNABINOIDS

- **Euphoria**
  (loquacity, cheerfulness)
- **Psychophysical wellbeing feeling**
  (lightness, abandon)

- **Distorted perceptions**
  (sight, hearing, time, touch)
- **Concentration problems**
- **Lack of motor coordination**
- **Tachycardia**
- **Neuropsychiatric disorders** (chronic)

COCAINE

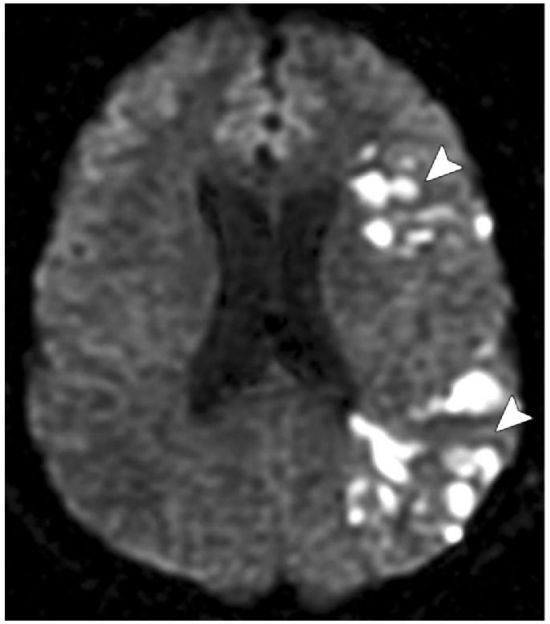
psychoactive compound from *Erythroxylum coca*

Tropane alkaloid extracted from the leaves of the plant, native to South America

MAIN EFFECTS OF COCAINE

- Wellbeing feeling
- Hyperactivity
- Euphoria
- Restlessness
- Hypertension
- Tachycardia

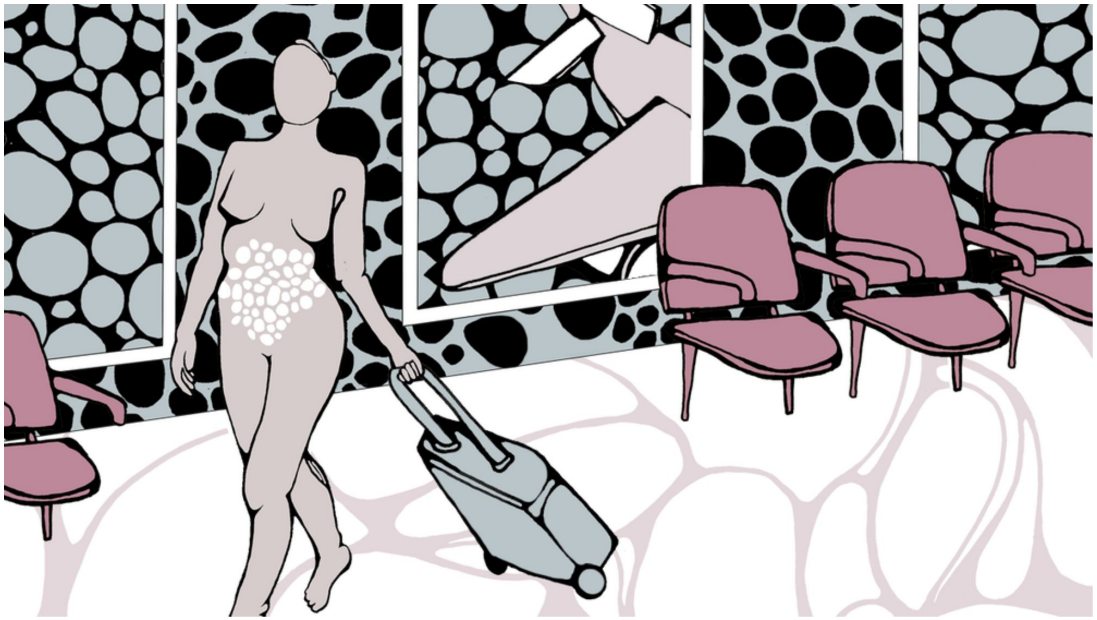
- “Omnipotence Syndrome”
- Lack of danger perception
- Hallucinations
- Paranoia
- Infarction, stroke



Cocaine-induced brain ischemia (arrows)

OPIATES and OPIOIDS

Alkaloids extracted from the latex exuding from the unripe capsules of *Papaver somniferum,* a plant widespread across most of Europe and Asia.



Moreover, semisynthetic and synthetic compounds are available.

MAIN EFFECTS OF OPIATES and OPIOIDS

drowsiness, lethargy
fatigue feeling
widespread wellbeing
dulling of any pain sensation and associated stress
indifference to normal concerns
inhibition of breathing functions
bradycardia

Chronic consumption: strong tolerance and dependence, progressive increase of consumed doses, very strong *craving*

When tolerance is strong, the huge amount of substance taken can lead to **acute intoxication, cardiovascular failure, respiratory failure, and death**

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PART II

«NEW PSYCHOACTIVE SUBSTANCES» CLASSIFICATION

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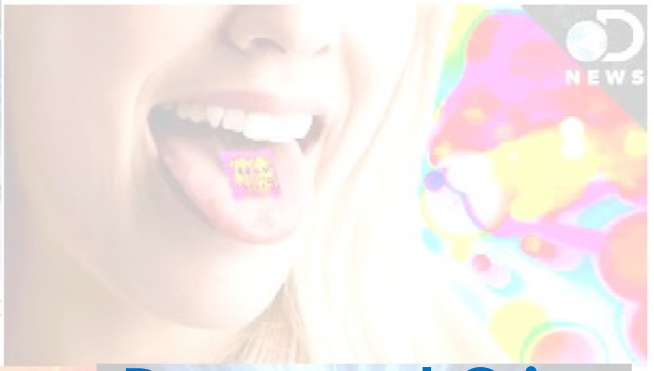
NEW PSYCHOACTIVE SUBSTANCES - NPS

NEW PSYCHOACTIVE SUBSTANCES - NPS

NPS are also known as
"legal highs"
"bath salts"
"research chemicals"



UNODC, United Nations' Office on Drugs and Crime – definition:

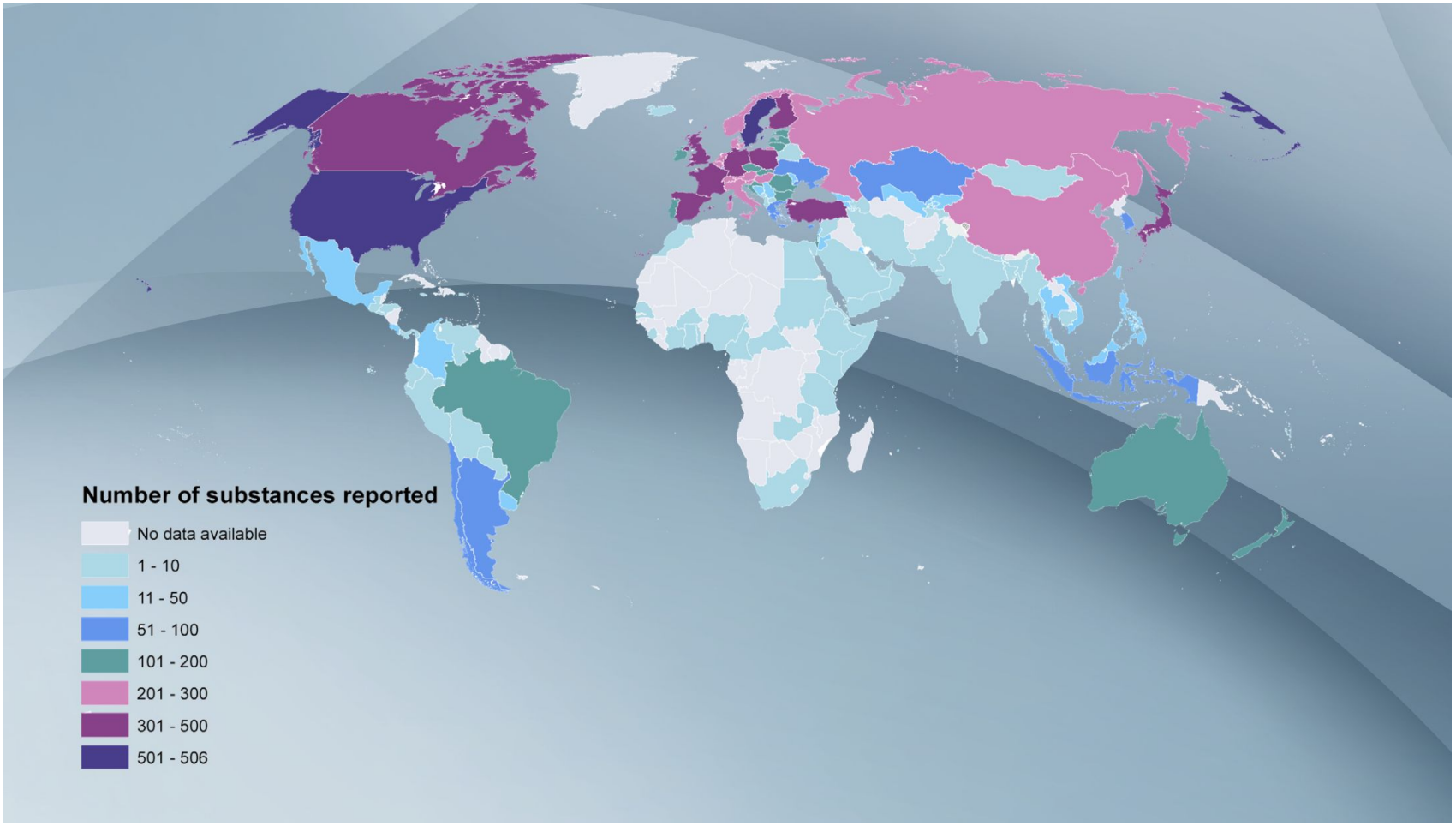
"Substances of abuse, either in a pure form or a preparation, that are not controlled by the 1961 Single Convention on Narcotic Drugs or the 1971 Convention on Psychotropic Substances, but which may pose a public health threat"

NEW PSYCHOACTIVE SUBSTANCES - NPS

The term "new" does not necessarily refer to new inventions — several NPS were first synthesized decades ago — but to substances that have recently become available (again) on the market

Source: United Nations Office on Drugs and Crime, Early Warning Advisory on NPS, 2021.

NEW PSYCHOACTIVE SUBSTANCES - NPS



Global emergence of new psychoactive substances, 2013-2021

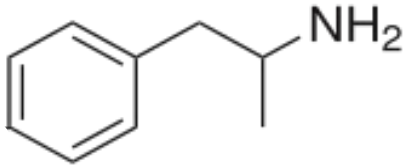
Source: United Nations Office on Drugs and Crime, Early Warning Advisory on NPS, 2021.

NPS – CLASSIFICATION?

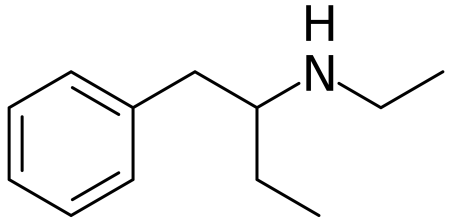
- Newly-synthesised compounds, «designer drugs»

Modifications to existing pharmaceutical drugs or substances of abuse, to

- Evade detection → **DANGER!**
- Avoid prosecution
- Obtain new (different), or more powerful, effects → **DANGER!**



AMPHETAMINE
A stimulant

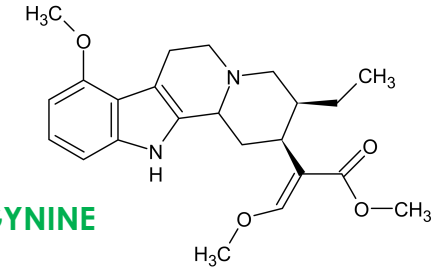


***N*,α-DIETHYLPHENYLETHYLAMINE, EAPB**
Still a stimulant, but a different one

- «Traditional» substances, marketed in new places or in new ways

Mostly natural substances, used as «new drugs» outside their place of origin, or their purified bioactive compounds

MITRAGYNA SPECIOSA
KRATOM



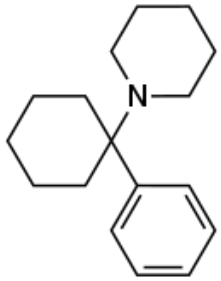
MITRAGYNINE

NPS – CLASSIFICATION?

- Well-known, «modern» substances, repurposed or rediscovered

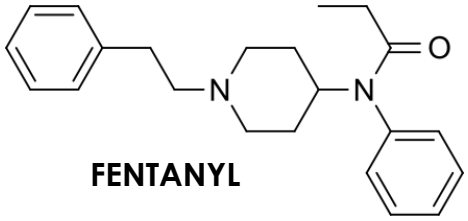
Substances of abuse follow popularity trends, so they can fall out of use and resurface as if they were «new».

PHENCYCLIDINE
PCP, «ANGEL DUST»



First synthesized in 1926
Approved for anaesthesia since the 1950s
Emerged as a recreational drug in the 1960s
Use declined in the 1980s-1990s
Again trending since the 2010s

Some pharmacological drugs can illegally be repurposed as substances of abuse



FENTANYL

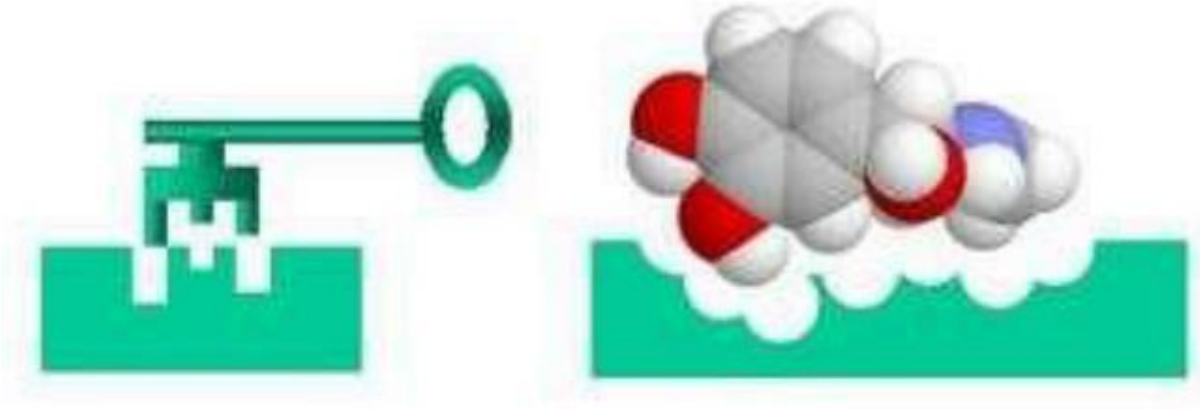
Highly potent pain medication (100 × morphine)
Increasingly illegally used «on the street» since the 1990s

NPS – CLASSIFICATION?

- Chemical structure
- Biological activity

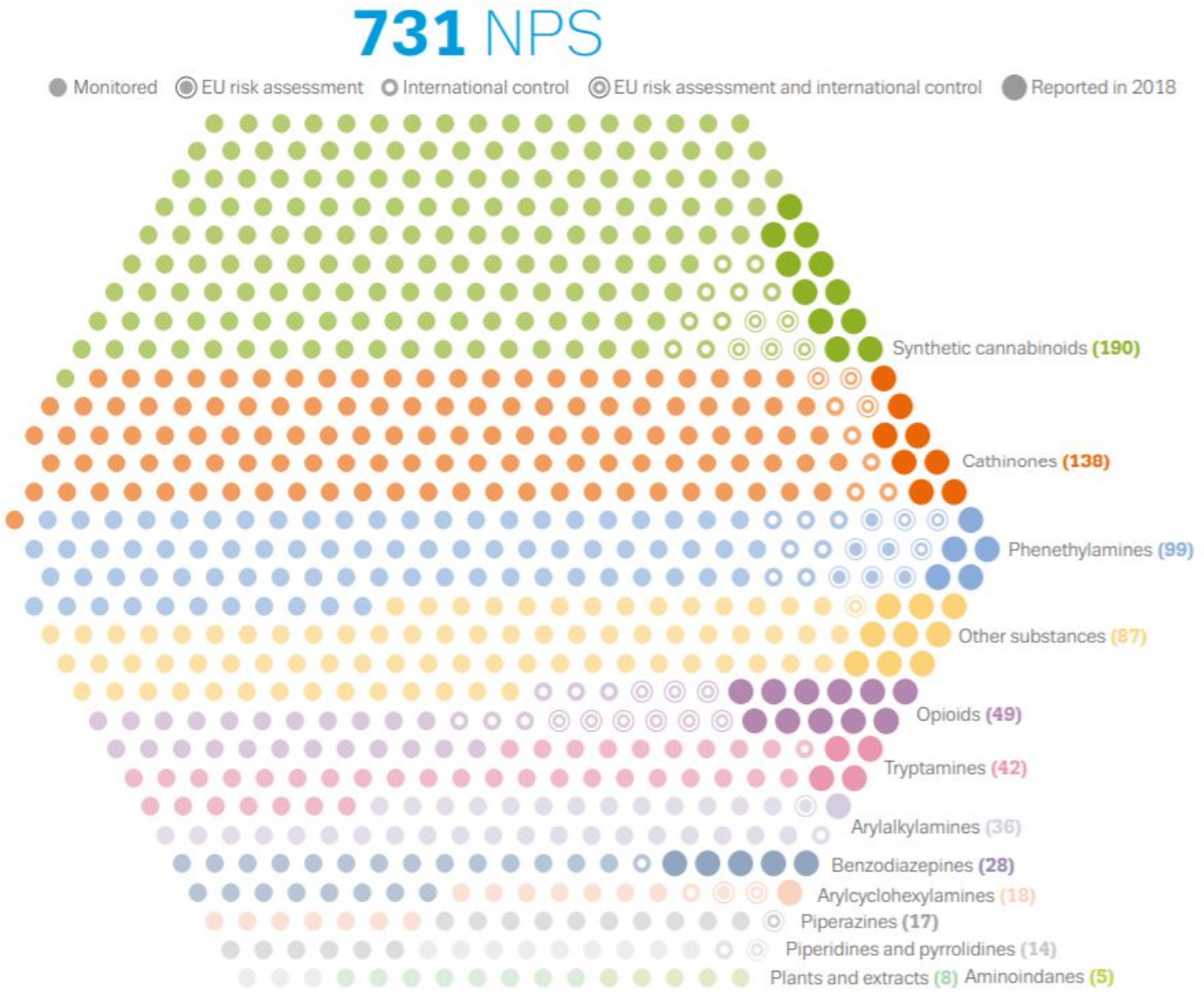
Usually closely related!

Bilogical activity □□ Substance (ligand) interaction with a biological target (receptor) □□ Lock-key mechanism □□ Chemical structure "is the key"!

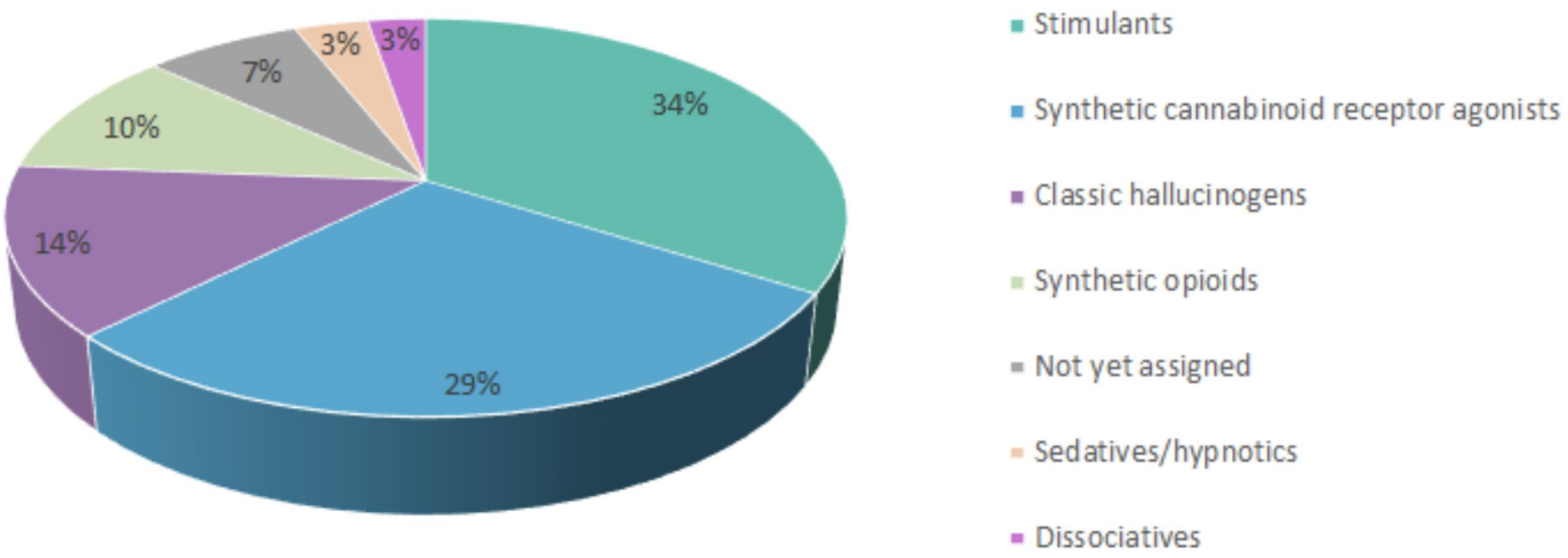


NEW PSYCHOACTIVE SUBSTANCES - NPS

EU Early Warning System (1997-2019)



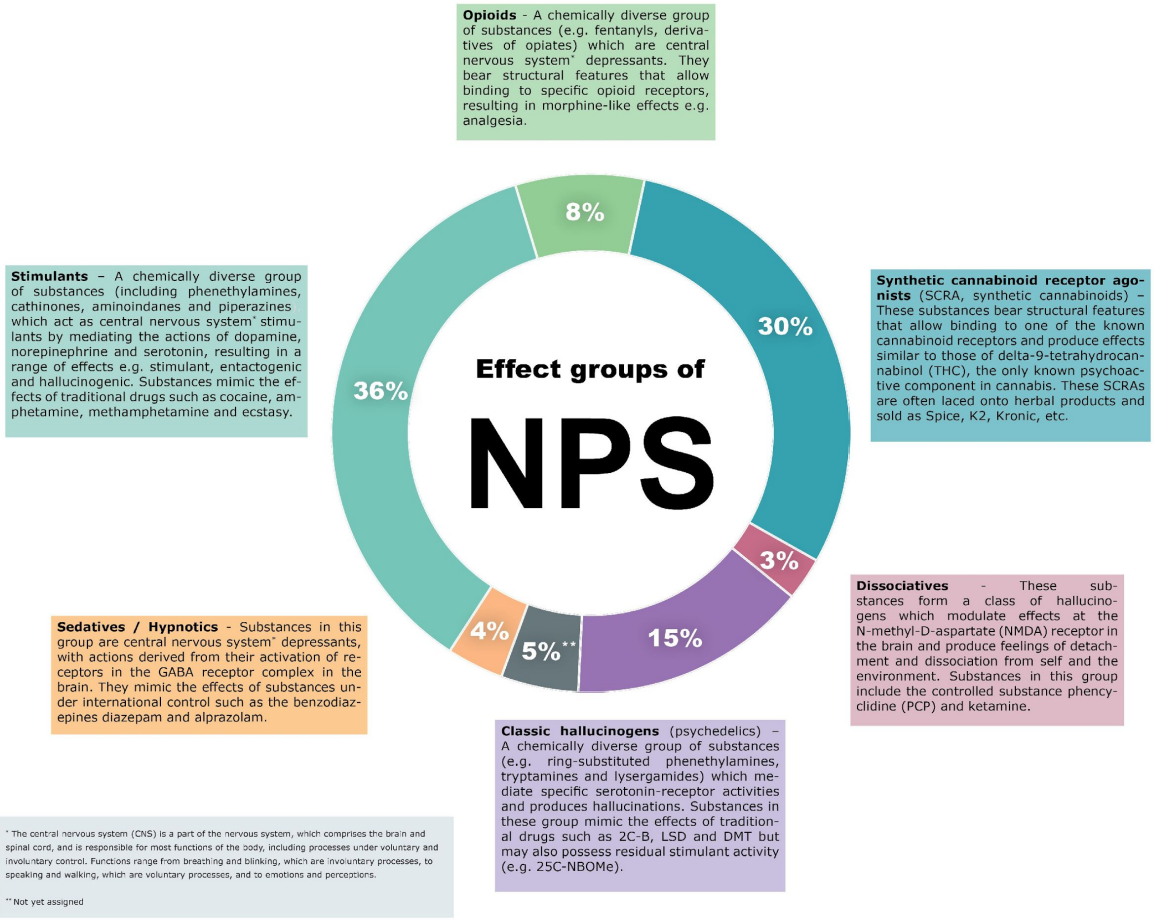
NPS BY EFFECT GROUP



Synthetic new psychoactive substances by effect group, up to December 2021

Source: United Nations Office on Drugs and Crime, Early Warning Advisory on NPS, 2021.

NPS CLASSIFICATION



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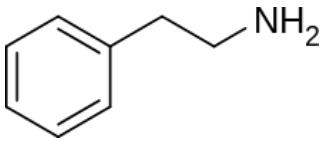
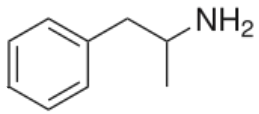
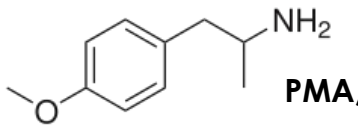
NPS: STIMULANTS



PHENYL ETHYL AMINE

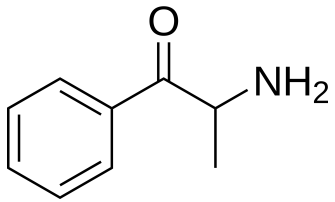


AMPHETAMINE
AminoMethylPHenylETylAMINE

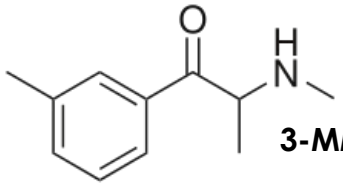


PMA, 4-MA

CATHA EDULIS
KHAT

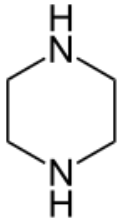


CATHINONE

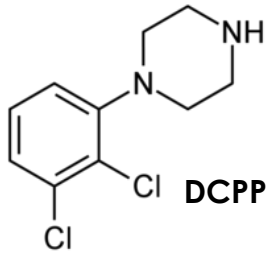


3-MMC

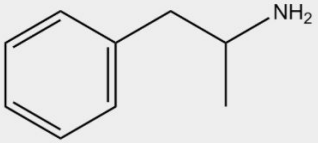
Stimulants – A chemically diverse group of substances (including phenethylamines, cathinones, aminoindanes and piperazines which act as central nervous system* stimulants by mediating the actions of dopamine, norepinephrine and serotonin, resulting in a range of effects e.g. stimulant, entactogenic and hallucinogenic. Substances mimic the effects of traditional drugs such as cocaine, amphetamine, methamphetamine and ecstasy.



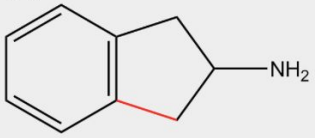
PIPERAZINE



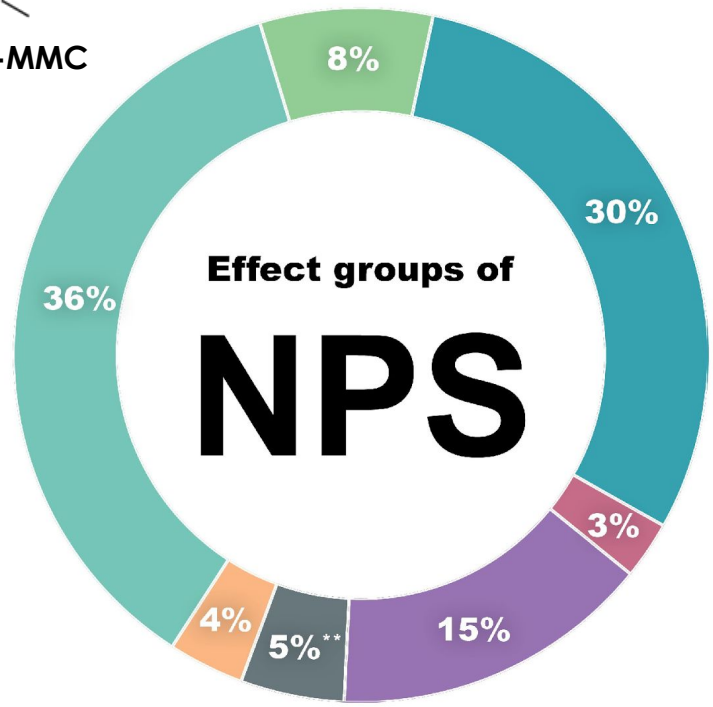
DCPP



AMPHETAMINE

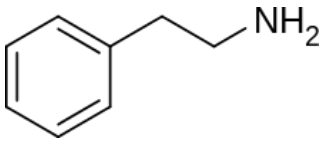


AMINOINDANE



Source: United Nations Office on Drugs and Crime, Early Warning Advisory on NPS, 2021.

NPS: STIMULANTS



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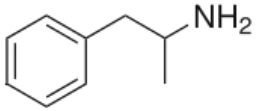

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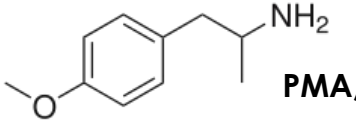

PMA, 4-MA

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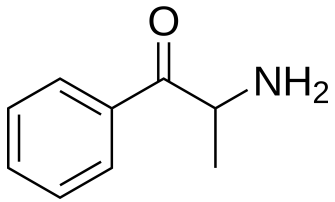
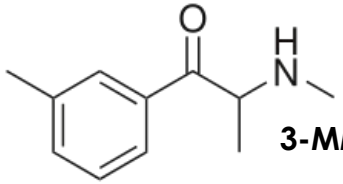
KHAT



CATHINONE



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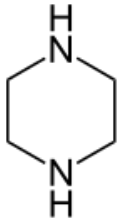
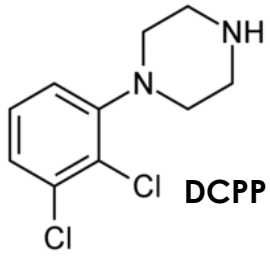
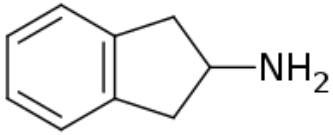


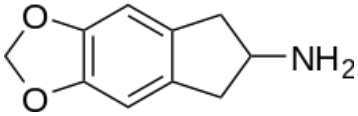
PIPERAZINE



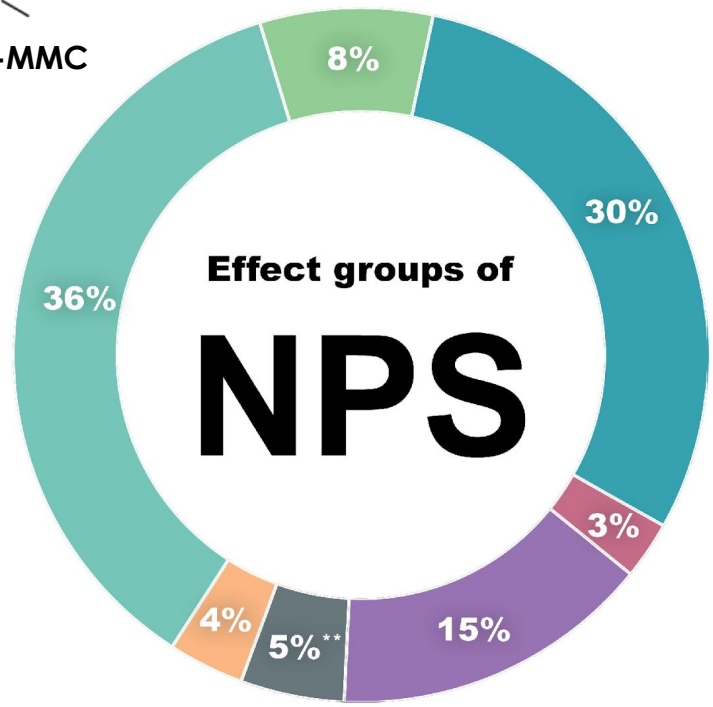
DCPP



2-AMINOINDANE

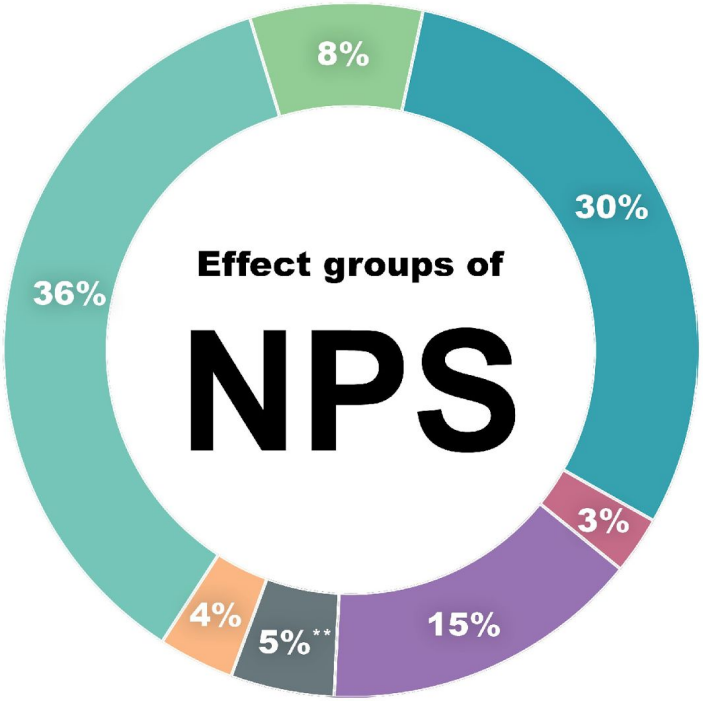


MDAI



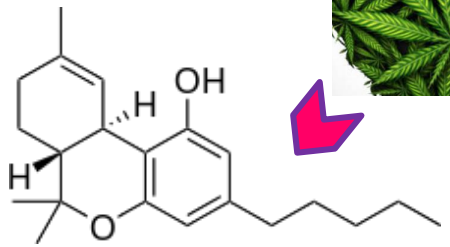
Source: United Nations Office on Drugs and Crime, Early Warning Advisory on NPS, 2021.

NPS: SYNTHETIC CANNABINOIDS

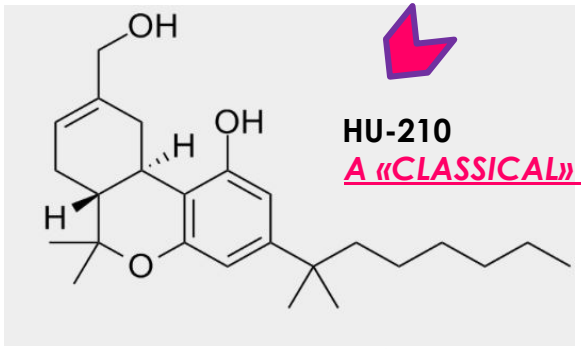


Synthetic cannabinoid receptor agonists (SCRA, synthetic cannabinoids) – These substances bear structural features that allow binding to one of the known cannabinoid receptors and produce effects similar to those of delta-9-tetrahydrocannabinol (THC), the only known psychoactive component in cannabis. These SCRAs are often laced onto herbal products and sold as Spice, K2, Kronic, etc.

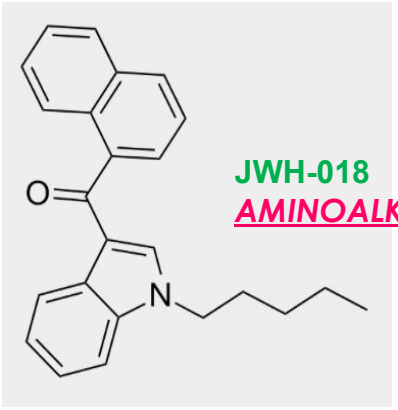
CANNABIS



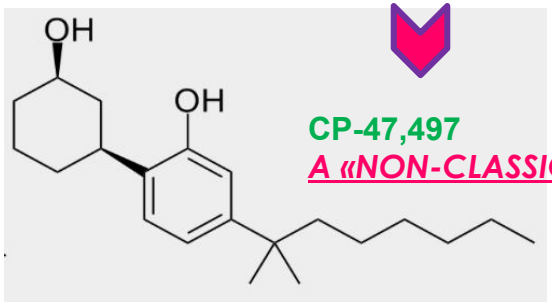
Δ9-TETRAHYDROCANNABINOL, THC
A NATURAL CANNABINOID



HU-210
A «CLASSICAL» CANNABINOID



JWH-018
AMINOALKYLINDOLE

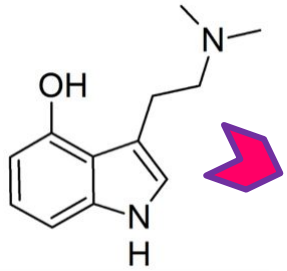


CP-47,497
A «NON-CLASSICAL» CANNABINOID

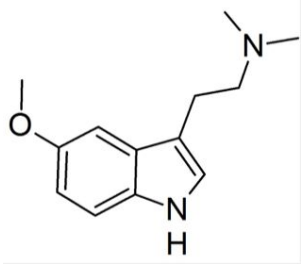
Source: United Nations Office on Drugs and Crime, Early Warning Advisory on NPS, 2021.

NPS: HALLUCINOGENS

PSYLOCIBE MUSHROOMS

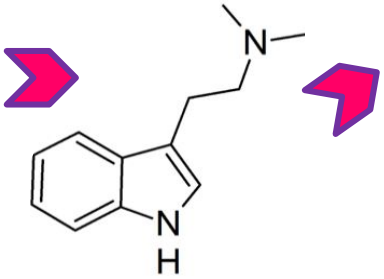


PSYLOCIN

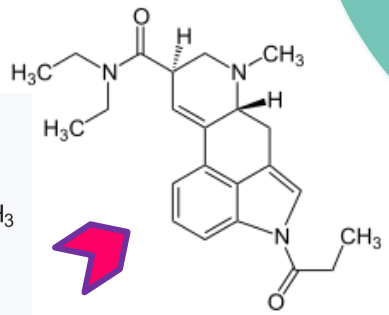


5-MeO-DMT

AYAHUASCA

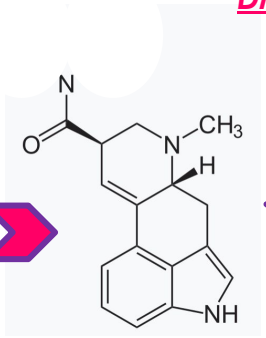


DIMETHYLTRYPTAMINE
DMT

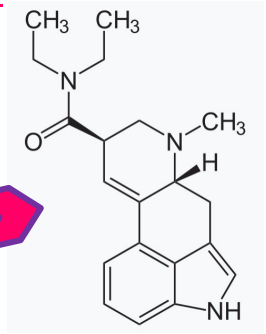


1P-LSD

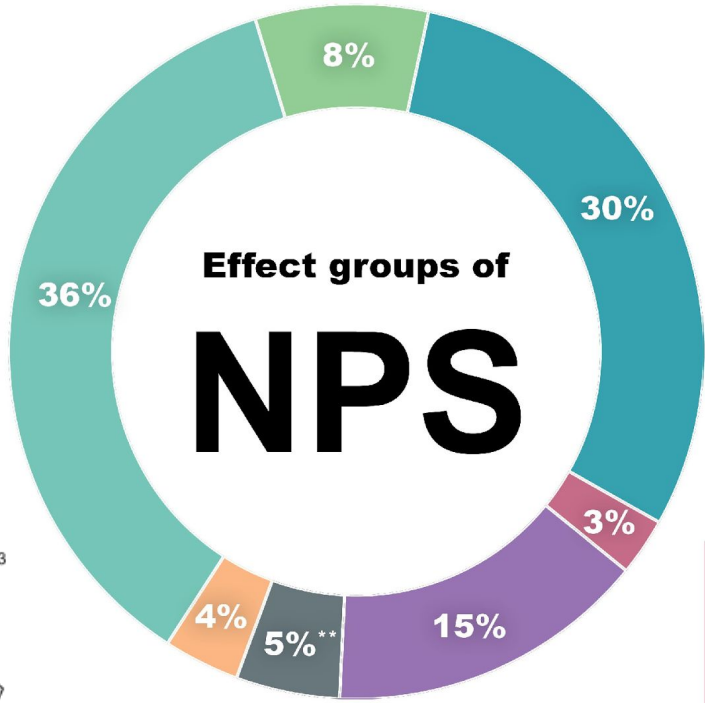
ERGOT FUNGI



LYSERGIC ACID



LYSERGIC ACID DIETHYLAMIDE, *LSD*



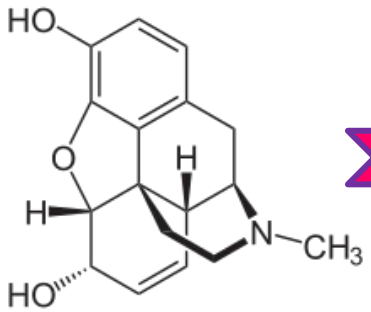
Classic hallucinogens (psychedelics) – A chemically diverse group of substances (e.g. ring-substituted phenethylamines, tryptamines and lysergamides) which mediate specific serotonin-receptor activities and produces hallucinations. Substances in these group mimic the effects of traditional drugs such as 2C-B, LSD and DMT but may also possess residual stimulant activity (e.g. 25C-NBOMe).

Source: United Nations Office on Drugs and Crime, Early Warning Advisory on NPS, 2021.

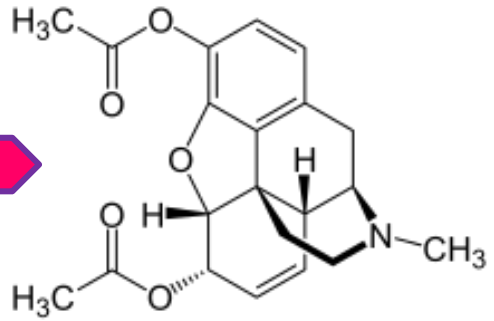
NPS: OPIOIDS

Opioids - A chemically diverse group of substances (e.g. fentanyls, derivatives of opiates) which are central nervous system* depressants. They bear structural features that allow binding to specific opioid receptors, resulting in morphine-like effects e.g. analgesia.

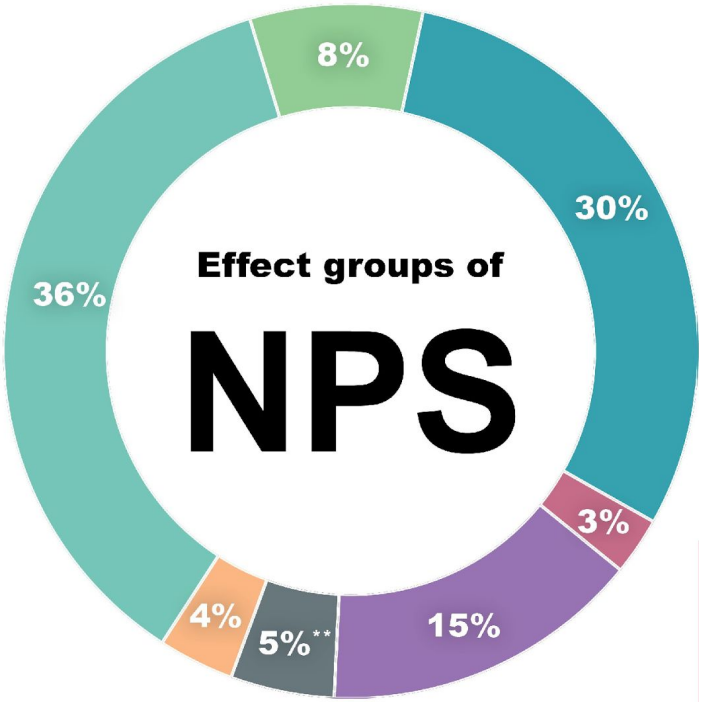
PAPAVER CAPSULES

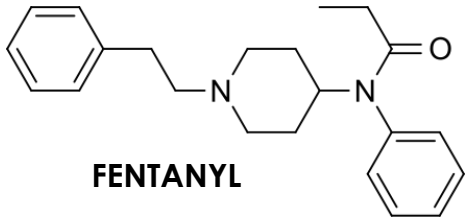


MORPHINE

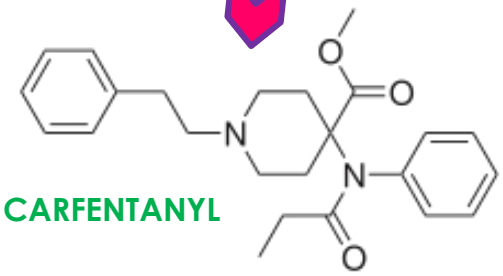


HEROIN

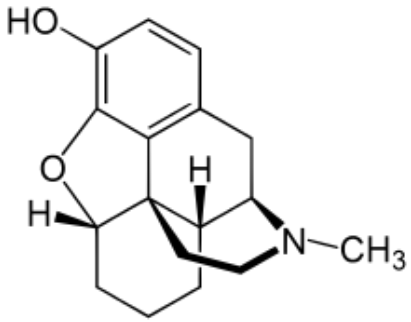




FENTANYL



CARFENTANYL

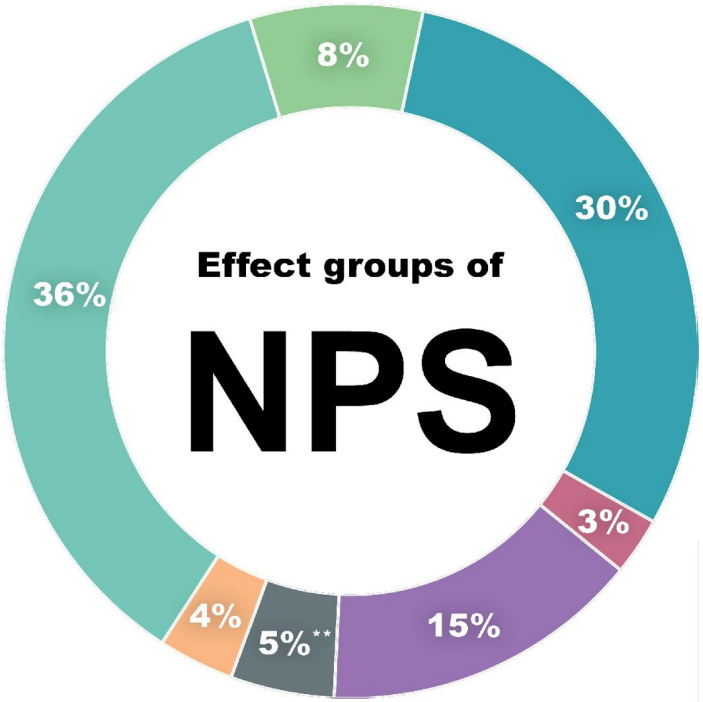


DESOMORPHINE
«KROKODIL»

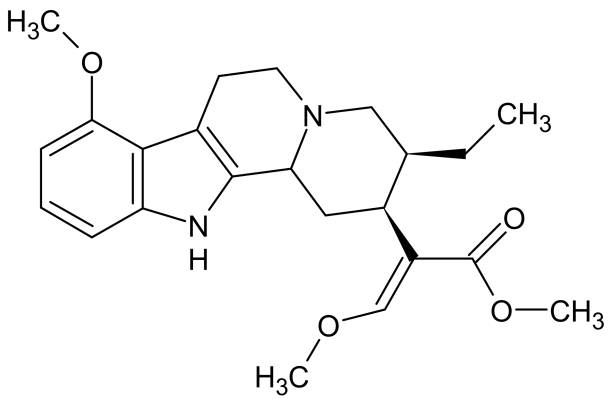
Source: United Nations Office on Drugs and Crime, Early Warning Advisory on NPS, 2021.

NPS: OPIOIDS

Opioids - A chemically diverse group of substances (e.g. fentanyls, derivatives of opiates) which are central nervous system* depressants. They bear structural features that allow binding to specific opioid receptors, resulting in morphine-like effects e.g. analgesia.



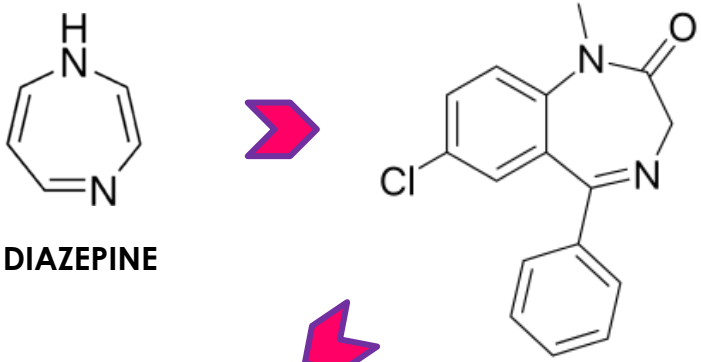
MITRAGYNA SPECIOSA
KRATOM



MITRAGYNINE

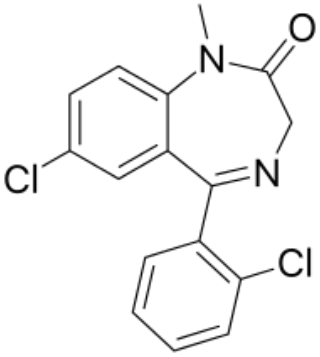
Source: United Nations Office on Drugs and Crime, Early Warning Advisory on NPS, 2021.

NPS: SEDATIVES/HYPNOTICS

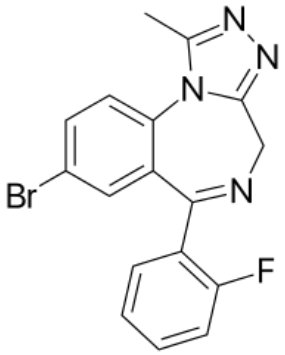


DIAZEPINE

DIAZEPAM
A BENZODIAZEPINE

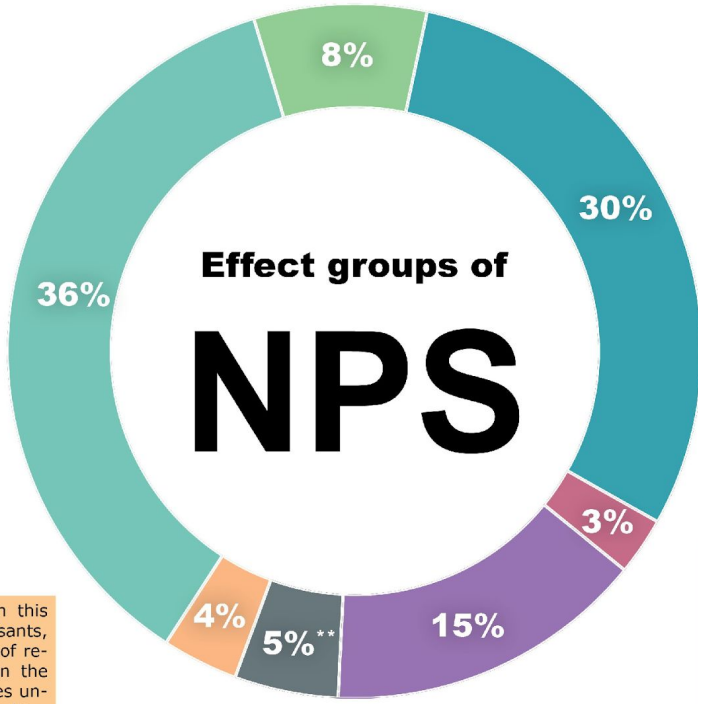


DICLAZEPAM



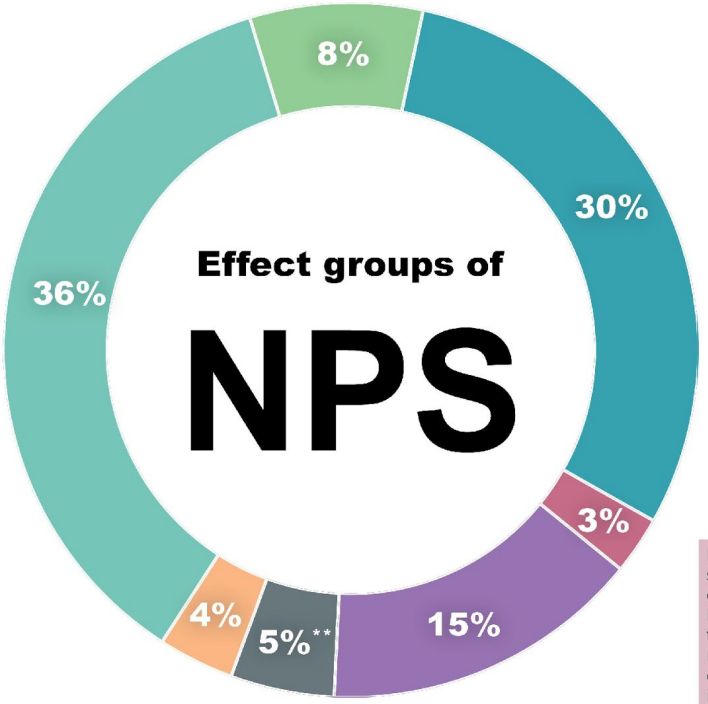
FLUBROMAZOLAM

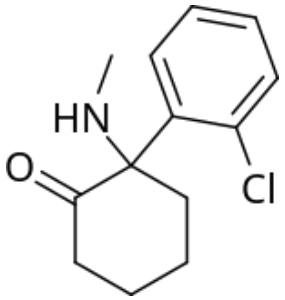
Sedatives / Hypnotics - Substances in this group are central nervous system* depressants, with actions derived from their activation of receptors in the GABA receptor complex in the brain. They mimic the effects of substances under international control such as the benzodiazepines diazepam and alprazolam.



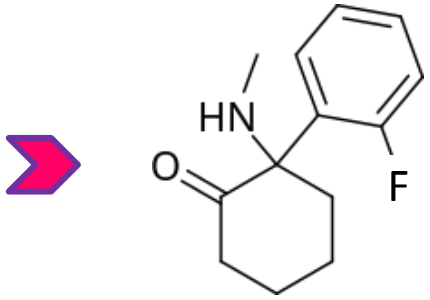
Source: United Nations Office on Drugs and Crime, Early Warning Advisory on NPS, 2021.

NPS: DISSOCIATIVES

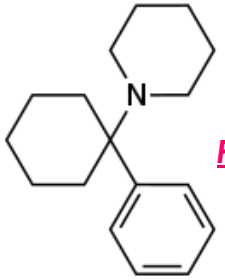




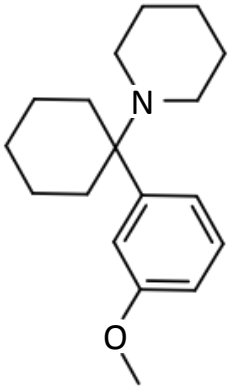
KETAMINE
«SPECIAL K»



2-FLUORODESCHLOROKETAMINE
2FDCK



PHENCYCLIDINE
PCP, «ANGEL DUST»

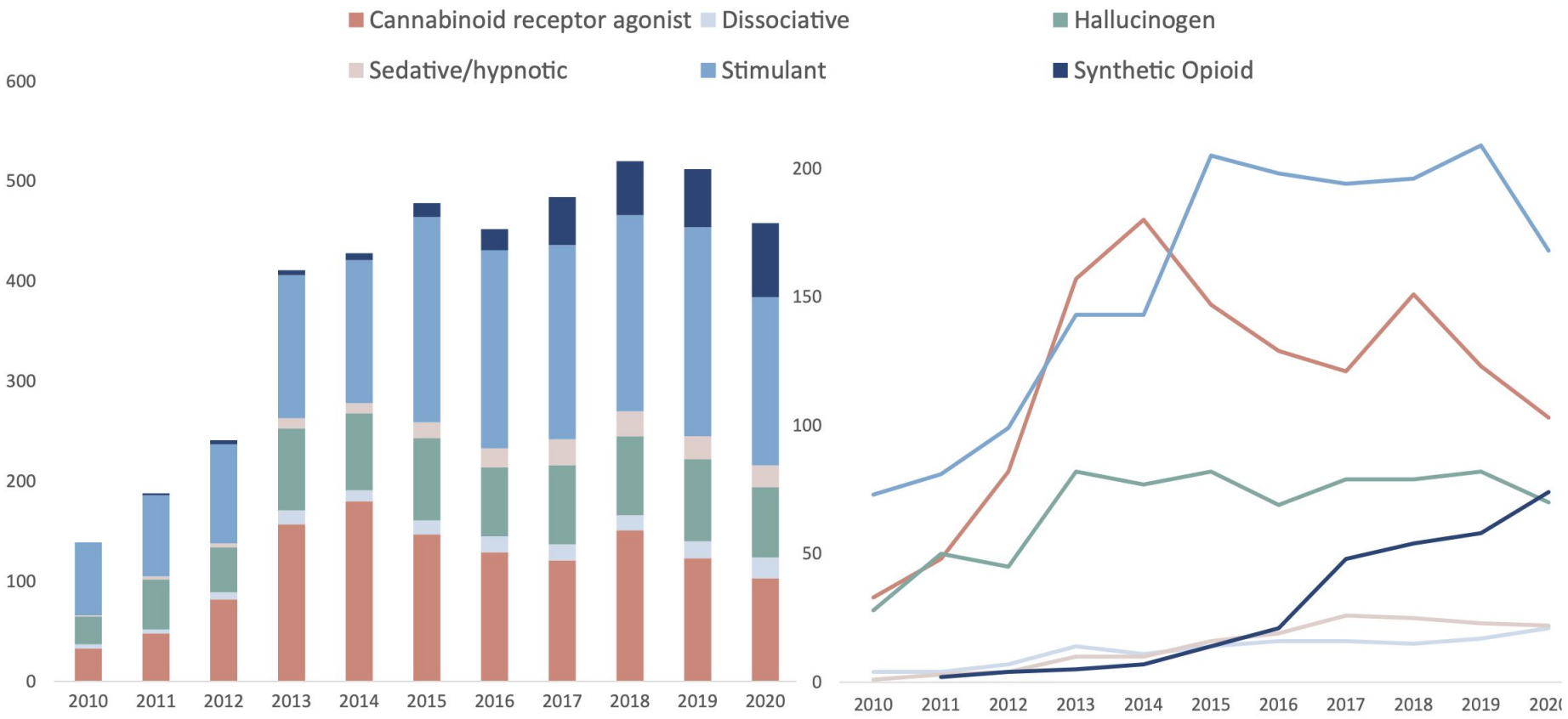


3-MeO-PCP

Dissociatives - These substances form a class of hallucinogens which modulate effects at the N-methyl-D-aspartate (NMDA) receptor in the brain and produce feelings of detachment and dissociation from self and the environment. Substances in this group include the controlled substance phencyclidine (PCP) and ketamine.

Source: United Nations Office on Drugs and Crime, Early Warning Advisory on NPS, 2021.

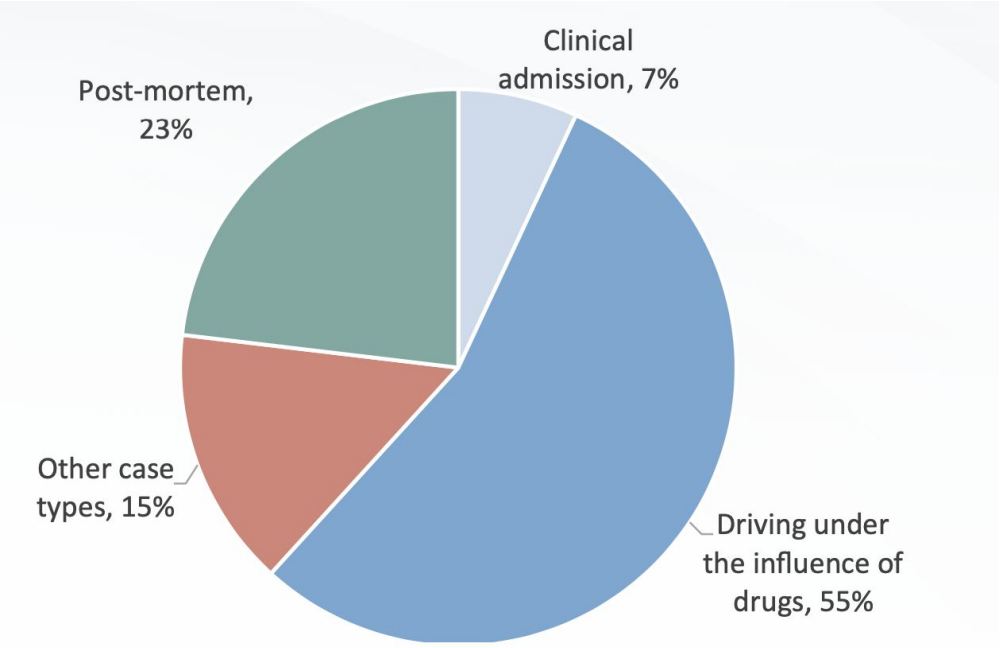
NPS: TRENDS



Emergence of NPS by effect group reported to the UNODC EWA 2010 - 2020

Source: UNODC, Current NPS Threats, Volume IV, November 2021

NPS: DIAGNOSIS

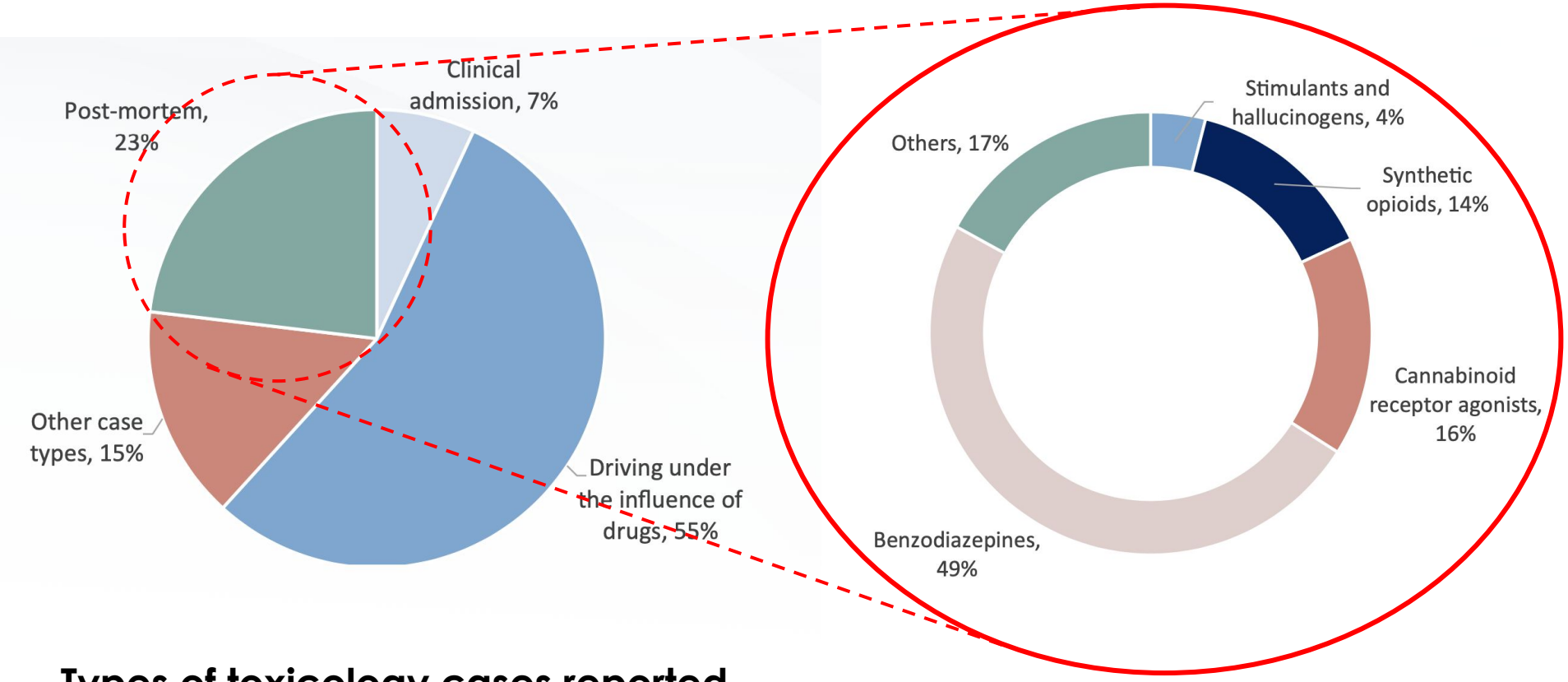


Types of toxicology cases reported between May 2020 and April 2021

Some NPS toxicity cases are never discovered due to the lack of knowledge of their toxicity, chemical structures, diffusion, etc.

Source: UNODC, Current NPS Threats, Volume IV, November 2021

NPS: TOXICOLOGY

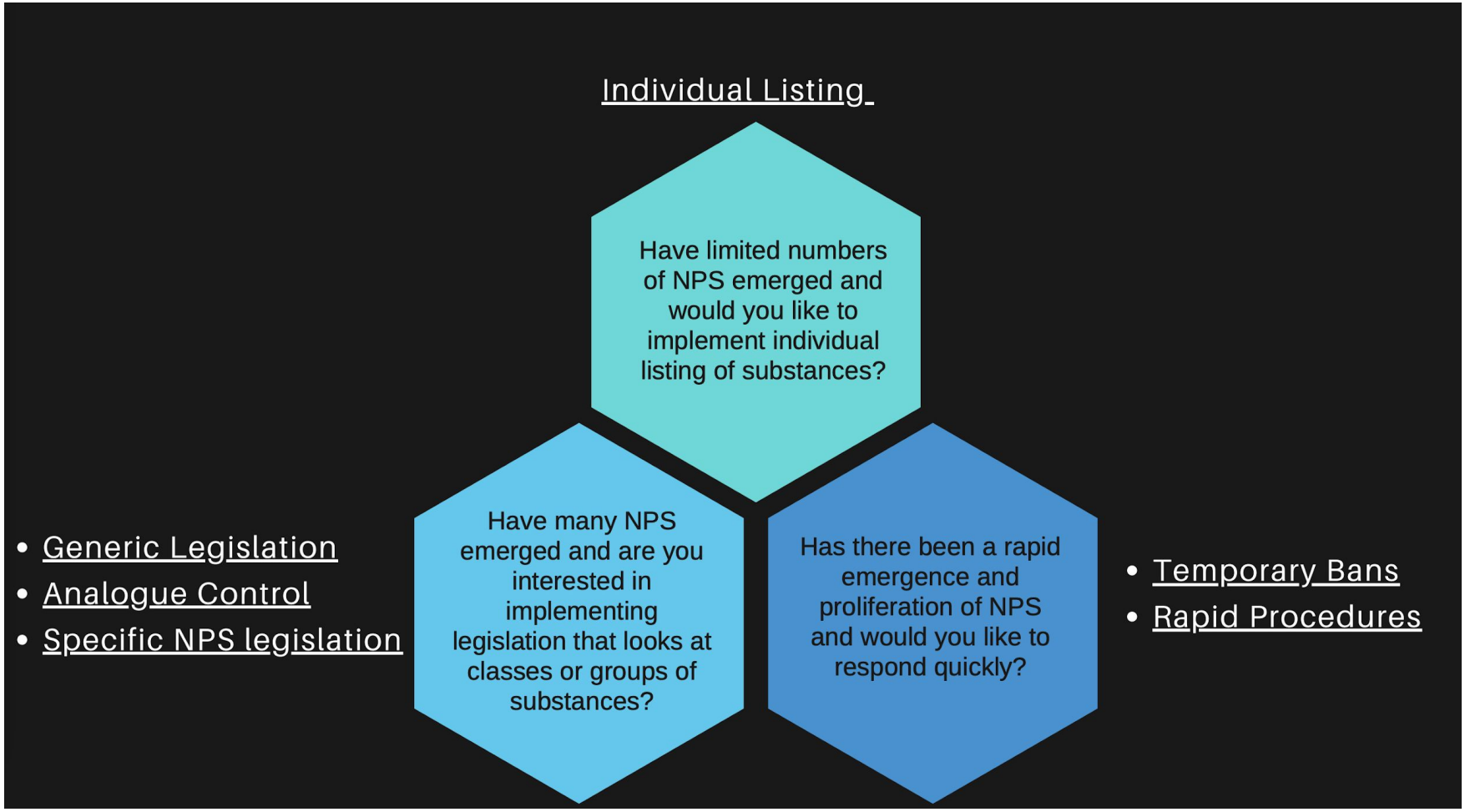


Types of toxicology cases reported between May 2020 and April 2021

Groups of NPS associated with fatalities

Source: UNODC, Current NPS Threats, Volume IV, November 2021

NPS: LEGISLATIVE OPTIONS



Source: United Nations Office on Drugs and Crime, Early Warning Advisory on NPS, 2021.