VOLUME C
Pharmacological Treatment for Drug Use Disorders
Drug Treatment for Special Populations
Module 1

Drug Dependence basics

1. Drug use, addiction and dependence
2. Management of Alcohol & benzodiazepine dependence
3. Psychostimulants
4. Volatile substances, cannabis and new psychoactive substances
Volatile substances, cannabis and new psychoactive substances
Volatile substances and inhalants
Volatile substances
Although other abused drugs can be inhaled, the term inhalants is reserved for the wide variety of substances – including solvents, aerosols, gases, and nitrites – that are rarely, if ever, taken via any other route of administration.

(NIDA)
Volatile substances: what are they?

► Commonly referred to as “inhalants,” “solvents,” “solvent based products”

► Common terms include “chroming,” “huffing,” “sniffing,” “bagging”

► Comprise a group of chemical compounds that change from a liquid or semi-solid to gaseous state when exposed to air

► Inhalation of the vapour through the mouth or nose produces a psychoactive effect (intoxication and euphoria)
What substances are used?

► Inhalants are found in hundreds of products at supermarkets, newsagencies, hardware stores, and industrial sites

► 4 categories of inhalants:
  – Solvents
  – Aerosols
  – Gases
  – Nitrites
Pharmacology

- High lipid solubility promotes rapid absorption from the lungs
- Acute intoxication occurs after 3–5 minutes (10–15 breaths are sufficient)
- Peak plasma concentration reached in 15–30 minutes
- Half-life varies from hours to days
- Metabolised in kidneys and liver
- Accumulate in lipid rich organs (i.e., liver, brain)
- Crosses placental barrier
Many brain systems involved in the anesthetic, intoxicating, and reinforcing effects

Inhalants other than nitrites, cause pleasurable effect by depressing CNS

Nitrites: vasodilatation & constriction, rather than act as anesthetic agents

Evidence from animal studies: mechanisms of action similar to other CNS depressants e.g. alcohol, sedatives & anesthetics

A 2007 animal study indicates that toluene, a solvent found in many commonly abused inhalants activates the brain’s dopamine system
Scope of inhalant abuse
Highest prevalence among 14- to 17-year-olds
Specific drug used when initiating illicit drug use: 2007

Note: The percentages add to greater than 100 percent because of a small number of respondents initiating multiple drugs on the same day.
# Inhalant misuse prevalence in the USA

## Monitoring the Future Study: Trends in Prevalence of Inhalants for 8th Graders, 10th Graders, and 12th Graders; 2016 (in percent)*

<table>
<thead>
<tr>
<th>Drug</th>
<th>Inhalants</th>
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<tbody>
<tr>
<td></td>
<td>Lifetime</td>
<td>Past Year</td>
<td>Past Month</td>
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<tr>
<td><strong>Time Period</strong></td>
<td></td>
<td></td>
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<tr>
<td>8th Graders</td>
<td>[7.70]</td>
<td>[3.80]</td>
<td>1.80</td>
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<tr>
<td>10th Graders</td>
<td>6.60</td>
<td>2.40</td>
<td>1.00</td>
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<tr>
<td>12th Graders</td>
<td>5.00</td>
<td>1.70</td>
<td>0.80</td>
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Inhalant use among high school students

High-School Students Reporting Having Ever Used Inhalants

- 8th grade: 10.00%
- 10th grade: 10.00%
- 12th grade: 5.00%

Source: University of Michigan, 2011 Monitoring the Future Study. Survey data can be found at www.drugabuse.gov
Inhalant abuse among young people: prevalence & trend

Past-Year Inhalant Use Among 8th-, 10th-, and 12th-Graders, 1991-2011
Mean age at first use for specific illicit drugs (2007)
Who uses inhalants? gender and race / ethnicity differences

Gender and race/ethnicity differences in past-year inhalant use among 8th-graders, 2011

![Bar chart showing the percentage of past-year inhalant use by gender and race/ethnicity among 8th-graders, 2011. The chart indicates that Hispanic students have the highest percentage (10.5%), followed by females (8.6%), males (5.5*), White students (7.1), and Black students (5.1).]
Inhalant use: purpose, patterns & methods of use
Why do youth use volatile substances?

► “Because it’s fun and exciting”
► “I like the way it makes me feel – I feel drunk”
► “It takes away my bad feelings”
► “I wanted to be part of the gang”
► “My brothers were doing it so I wanted to try it”
► “Because I want to do something my parents don’t like”
► “Because it’s easy to get and I’m not allowed to get alcohol”
Appeal of volatile substances

▸ Inexpensive

▸ Readily available despite legislation precluding sale to minors

▸ Can be packaged in small, discrete containers

▸ Create both rapid intoxication and rapid resolution of intoxication (can use and still return home sober)
Patterns and methods of use

3 major patterns of use:

► Experimental/occasional
► Social
► Long-term dependent/chronic
Inhalants: How are they used?

► “Sniffing” or “snorting” fumes from containers: inhalants are breathed in through the nose/mouth

► “Bagging”: sniffing/inhaling fumes sprayed/deposited inside a plastic or paper bag

► “Huffing” from an inhalant-soaked rag stuffed in the mouth

► Inhaling from balloons filled with nitrous oxide

► Spraying aerosols directly into the nose or mouth
Inhalants: intoxication & associated hazards

- Intoxication lasts only a few minutes
- Users seek to prolong the high by dangerous practice of inhaling repeatedly over several hours
- Successive inhalations can lead to loss of consciousness & even death
- They often feel less inhibited and less in control
- After heavy use lingering drowsiness & headache common
Early identification and intervention are the best ways to stop inhalant abuse before it causes serious health consequences. Parents, educators, family physicians, and other health care practitioners should be alert to the following signs:

- Chemical odours on breath or clothing
- Paint or other stains on face, hands, or clothes
- Hidden empty spray paint or solvent containers, and chemical-soaked rags of clothing
- Drunk or disoriented appearance
- Slurred speech
- Nausea or loss of appetite
- Inattentiveness, lack of coordination irritability and depression
Inhalant misuse
acute & chronic
effects
Inhalant effects

Most inhalants produce a rapid high that resembles alcohol intoxication, with initial excitation then drowsiness, disinhibition, lightheadedness, and agitation.
Hazards of chemicals found in commonly misused inhalants

- **Amyl nitrite, Butyl nitrite** (“poppers,” “video head cleaner”): Sudden sniffing death syndrome, suppressed immunologic function, injury to red blood cells (interfering with oxygen supply to vital tissues)

- **Benzene** (found in gasoline): Bone marrow injury, impaired immunologic function, increased risk of leukaemia, reproductive system toxicity

- **Butane, propane** (found in lighter fluid, hair and paint sprays): Sudden sniffing death syndrome via cardiac effects, serious burn injuries (because of flammability)

- **Freon** (used as a refrigerant and aerosol propellant): Sudden sniffing death syndrome, respiratory obstruction and death (from sudden cooling / cold injury to airways), liver damage
Hazards of chemicals found in commonly misused inhalants

- **Methylene chloride** (found in paint thinners and removers, degreasers): Reduction of oxygen-carrying capacity of blood, changes to the heart muscle and heartbeat

- **Nitrous oxide** ("laughing gas"), **hexane**: Death from lack of oxygen to the brain, altered perception and motor coordination, loss of sensation, limb spasms, blackouts caused by blood pressure changes, depression of heart muscle functioning

- **Trichloroethylene** (found in spot removers, degreasers): Sudden sniffing death syndrome, cirrhosis of the liver, reproductive complications, hearing and vision damage
### Desired effects

- Euphoria
- Excitation
- Exhilaration
- Sense of invulnerability
- Disinhibition

### Negative acute/short-term effects

- Drowsiness
- ‘Flu-like’ symptoms
- Nausea and vomiting
- Headaches
- Diarrhoea, abdominal pain
- Unpleasant breath
- Nosebleeds and sores
- Reckless behaviour
Effects at high doses:

► Slurred speech
► Poor coordination
► Disorientation, confusion
► Tremor
► Headaches
► Delusions
► Visual distortions or hallucinations
► Unpredictable behaviour, then:
  - ataxia
  - stupor
  - final stages (seizures, coma, cardiopulmonary arrest, death)
<table>
<thead>
<tr>
<th>Volatiles – overdoses</th>
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<tbody>
<tr>
<td><strong>High doses put user at risk for:</strong></td>
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<tr>
<td>• Convulsions, seizures, coma</td>
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<tr>
<td>• Respiratory depression</td>
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<tr>
<td>• Cardiac arrhythmias</td>
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<tr>
<td><strong>Injury or death can occur from:</strong></td>
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<tr>
<td>• Risk-taking behavior (drowning, falls, etc.)</td>
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<tr>
<td>• Suffocation</td>
</tr>
<tr>
<td>• Aspiration of vomit</td>
</tr>
<tr>
<td>• Burns, explosions</td>
</tr>
<tr>
<td>• Poisoning, organ failure (chronic use)</td>
</tr>
<tr>
<td>• Laryngeal spasm (Butane), respiratory arrest</td>
</tr>
<tr>
<td>• Lead poisoning (gasoline/petrol)</td>
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</table>
Nitrites are abused mainly by older adolescents & adults

Typically seek to enhance sexual function & pleasure

Associated with unsafe sexual practices with increased risk of infectious diseases e.g. AIDS/HIV

Animal research: possible link between Nitrite abuse & development and progression of infectious diseases & tumors

Research evidence: inhaling nitrites depletes many cells in the immune system and impairs immune mechanisms

A study found that even a relatively small number of exposures to Butyl nitrite can produce dramatic increases in tumor incidence and growth rate in animals
Tolerance and dependence

- Tolerance develops rapidly with regular use.

- Psychological and physical dependence, while rare, may also occur.
Withdrawal

► Onset and duration
  – Not classified in DSM IV but features of possible “withdrawal syndrome” may commence 24-48 hours after cessation of use

► Withdrawal Symptoms
  – Sleep disturbances
  – Tremor
  – Irritability and depression
  – Nausea
  – Diaphoresis
  – Fleeting illusions

► Treatment
  – Symptomatic
Patients may present with a variety of symptoms as a consequence of long-term use, including:

- Chronic headache
- Sinusitis, nosebleeds, increased nasal secretions
- Diminished cognitive function
- Ataxia
- Chronic coughing
- Chest pain or angina
- Tinnitus
- Extreme tiredness, weakness, dizziness
- Depression/anxiety
- Shortness of breath
- Indigestion
- Stomach ulcers
Complications from long-term use

CNS complications

• Acute encephalopathy
• Chronic neurological deficits
• Memory, thinking
• Hearing loss, and loss of sense of smell
• Nystagmus
• Motor impairment, especially secondary to lead poisoning
• Peripheral nerve damage

Other systems

• Renal – nephrolithiasis, glomerulopathies
• Hepatic – reversible hepatotoxicity
• Pulmonary – e.g., pulmonary hypertension, acute respiratory distress
• Cardiovascular – e.g., VF, arrhythmias, acute cardiomyopathy
• Haematological – e.g., blood dyscrasias
Inhalants neurotoxicity

Compared with the brain of an individual with no history of inhalant abuse (A), that of a chronic toluene abuser (B) is smaller and fills less of the space inside the skull (the white outer circle in each image). Courtesy of Neil Rosenberg, M.D., NIDA Research Report (NIH 05-3818).
Inhalant abuse in pregnancy: impact on infants & children

- Research reveals possibility of increased risk of developmental harm to infants & children of mothers who abused inhalants while pregnant
- A number of case reports note abnormalities in newborns & subsequent developmental impairment in children
- Evidence from Animal studies – prenatal Toluene exposure: reduced birth weights, skeletal abnormalities, delayed neurobehavioral development, altered metabolism, food intake & weight gain
- However, no well-controlled prospective study of the effects of prenatal exposure to inhalants in humans has been conducted, and it is not possible to link prenatal exposure to a particular chemical to a specific birth defect or developmental problem
Use of volatile substances (as with use of other psychoactive drugs) impacts not only personal health but also:

► Families
► Workplace safety
► Community (e.g., anti-social behaviour)
Interventions

► Brief intervention
► Counselling
► Group counselling
  – family support and counselling
  – be involved in developing community responses (e.g., drug action teams)
► Reduce health and social consequences

Avoid lectures to school/youth groups – evidence suggests it may increase curiosity and level of use.
Responding to intoxication

- Ensure fresh air
- Be calm and calming
- Don’t chase, argue, use force
- Persuade to cease sniffing (if able to understand)
- Take person to a safe environment
- Don’t attempt to counsel while intoxicated
- Follow-up with parents
- If drowsy or heavily intoxicated – consider the best environment for the individual and monitor physical and mental health
Where are we so far?

- What are volatile substances?
- Who most commonly uses inhalants and why?
- How can inhalant use be recognised?
- How to respond to inhalants intoxication?
Break
Cannabis
Cannabis

► The most widely used illicit drug
► The drug most likely to be seen in general medical practise
► Generally an experimental or recreational drug, but the most common illicit drug of dependence
► Use is common among polydrug users
► 70% of all drug-related offences relate to cannabis

THC or delta9tetrahydrocannabinol is the active ingredient of cannabis
Let’s think!

Case study

► Is Mark’s presentation consistent with his drug use?

► How long are his symptoms likely to last?

► What advice might you give him regarding the problems caused by his drug use?

Mark is a 23-year-old unemployed labourer who presents ostensibly with fatigue. On examination, some psychotic symptoms are apparent. Upon questioning, he says he has been smoking 30 cones of cannabis a day. He is restless, with significant mood swings, racing thoughts and paranoia but no real features of lasting psychosis.
Cannabis epidemiology
Cannabis continues to be the most widely cultivated, produced, trafficked and consumed drug worldwide.

The Americas, followed by Africa, remain the main markets for cannabis herb.

Europe, North Africa and the Near and Middle East remain the main markets for cannabis resin.

Despite major changes in some regions, global cannabis consumption has remained rather stable in recent years.
Cannabis prevalence

Use of cannabis in 2014 (or latest year available)
Cannabis prevalence: global trend changes

Expert perception of trend changes in the use of Cannabis, 2014 (or latest year available backward to 2010)
Cannabis forms
Cannabis clinical properties
Frequently, but erroneously, classified as a narcotic, sedative or hallucinogen. Sits alone within a unique class.

Degree of effects determined by the THC concentration of specific cannabis material used.

Major active constituent is THC (delta-9-tetrahydrocannabinol)

- Rapidly absorbed and metabolised when smoked, less so when ingested (1–3 hours for psychoactive effects)

Attaches to specific cannabinoid receptors (endogenous brain molecule – anandamide)
Two types of cannabinoid receptors: CB1 & CB2

- CB1 receptors in brain (cortex, hippocampus, basal ganglia, amygdala) and peripheral tissues (testes, endothelial cells)
- CB2 receptors associated with the immune system

Most cannabis effects are via THC acting on CB1 receptors, which facilitate activity in mesolimbic dopamine neurones
Cannabis: forms

Forms include:

► Dried flowers/leaves / buds (marijuana/ganja)
  – 1% – 24% THC (depending on genetic and environmental factors)

► Extracted dried resin, sometimes mixed with dried flowers and pressed into a cube (hashish)
  – around 10% – 20% THC

► Extracted oil using an organic solvent (hashish oil)
  – 15% – 30% THC
Route of administration can affect dose:

► Smoked (joint, pipe, bong, bucket bong, δ dose )
  – 50% absorbed, peak concentration 10 – 30 mins, lasts 2 – 4 hours

► Ingested (cake, biscuits)
  – 3% – 6% absorbed, peak concentration 2 – 3 hours, lasts up to 8 hours
Cannabis: time to peak effect

(Smoked)
Cannabis short term & long term effects
## Adverse consequences of marijuana use

<table>
<thead>
<tr>
<th><strong>Acute</strong> (present during intoxication)</th>
<th><strong>Persistent</strong> (lasting longer than intoxication, but may not be permanent)</th>
<th><strong>Long-term</strong> (cumulative effects of repeated use)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Impaired short-term memory</td>
<td>• Impaired learning and coordination</td>
<td>• Potential for marijuana addiction</td>
</tr>
<tr>
<td>• Impaired attention, judgment, and other cognitive functions</td>
<td>• Sleep problems</td>
<td>• Impairments in learning and memory with potential loss of IQ*</td>
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<tr>
<td>• Impaired coordination and balance</td>
<td></td>
<td>• Increased risk of chronic cough, bronchitis</td>
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<tr>
<td>• Increased heart rate</td>
<td></td>
<td>• Increased risk of other drug and alcohol use disorders</td>
</tr>
<tr>
<td>• Anxiety, paranoia</td>
<td></td>
<td>• Increased risk of schizophrenia in people with genetic vulnerability**</td>
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<tr>
<td>• Psychosis (uncommon)</td>
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Cannabis: acute effects

- Analgesia
- Euphoria, altered concentration, relaxation, sense of calm or wellbeing, disinhibition, confusion
- Increased appetite, thirst
- Heightened visual, auditory and olfactory perceptions, inability to appropriately interpret surroundings
- Reduced intra-ocular pressure (used for glaucoma treatment)
- Nausea, headaches
- With consistent use, URTIs
- Problems associated with intoxication

Cannabis overdose does not result in death
Cannabis intoxication

Cannabis use can cause infused vasculature/red eyes
Cannabis also affects:
- Short-term memory
- Ability to learn and retain new information
- Task performance
- Balance, stability, mental dexterity
- The cardiovascular and respiratory systems

Short-term, high-dose use may result in:
- Synaesthesia
- Pseudo- or true hallucinations
- Delusions, feelings of depersonalisation
- Paranoia, agitation, panicky feelings, “psychosis”
Long-term effects

► CNS
  – Respiratory system
  – Cardiovascular system

► Immune system

► Endocrine and reproductive systems

► Adverse social outcomes
  – Mental health problems
  – Cognitive impairment
  – Dependence
Cannabis effect on brain

Marijuana’s Effects on the Brain

HYPOTHALAMUS
Controls appetite, hormonal levels and sexual behavior

NEOCORTEX
Responsible for higher cognitive functions and the integration of sensory information

BASAL GANGLIA
Involved in motor control and planning, as well as the initiation and termination of action

HIPPOCAMPUS
Important for memory and the learning of facts, sequences and places

VENTRAL STRIATUM
Involved in the prediction and feeling of reward

CEREBELLUM
Center for motor control and coordination

AMYGDALA
Responsible for anxiety, emotion and fear

BRAIN STEM AND SPINAL CORD
Important in the vomiting reflex and the sensation of pain

When marijuana is smoked, its active ingredient, THC, travels throughout the body, including the brain, to produce its many effects. THC attaches to sites called cannabinoid receptors on nerve cells in the brain, affecting the way those cells work. Cannabinoid receptors are abundant in parts of the brain that regulate movement, coordination, learning and memory, higher cognitive functions such as judgment, and pleasure.
Distribution of cannabinoid receptors in the rat brain. Brain image reveals high levels (shown in orange and yellow) of cannabinoid receptors in many areas, including the cortex, hippocampus, cerebellum, and nucleus accumbens (ventral striatum).
Cannabis & psychosis
Cannabis and schizophrenia

- Those who began using cannabis at age 15 or younger are 2 times likely to develop a psychotic disorder & 4 times likely to experience delusional symptoms.

- Several studies world-wide have found that cannabis use by 18yrs can significantly increase diagnosis of schizophrenia.

- The amount of the drug used, the age at first use, and genetic vulnerability may contribute.
Cannabis and schizophrenia

- Around 13% of cases of schizophrenia could be averted if cannabis use was prevented.

- Users with a gene variant for catechol-O-methyltransferase (COMT), (involved in degradation of neurotransmitters such as dopamine and norepinepherine), may have a particularly increased risk of developing schizophrenia.
The “cannabis dependence syndrome,” while now clearly described, is perceived as less pronounced than for other drugs (i.e., opioids, alcohol).

Category for Cannabis use disorder and Cannabis withdrawal has been added to the new version of DSM (DSM5).

Variation in frequency, duration of use and dose result in difficulty predicting rapidity, development, and duration of withdrawal.
Withdrawal symptoms

- Anxiety, restlessness, irritability, agitation
- Racing thoughts
- Mood swings and increased aggression
- Feelings of unreality
- Fear, sometimes paranoia
- Anorexia, stomach pain
- Weight loss
- Increased body temperature
- Nausea and salivation
- Drowsiness, through disturbed sleep, and an increase in vivid dreams
Assessment

Assessment should focus on:

- Drug type, history, route, pattern of use, expenditure
- Tolerance, dependence, potential for withdrawal
- History or evidence of psychiatric sequelae
- Health complications of cannabis use
- Psychosocial context of use (time spent using, obtaining drug, social impact, etc.)
- Previous attempts to cut down or quit

Assessment tools:

- SDS
- ASSIST
Cannabis treatment

► 1 in 10 cannabis users will become dependent & cannabis addiction produces a withdrawal syndrome, hence evidence-based cannabis treatment has a vital role

► For those who have not progressed to full cannabis addiction, screening, brief interventions and referral to treatment (SBIRT) mechanisms may be appropriate
Cannabis treatment
Cognitive Behavioral Therapy (CBT)

► CBT is a major method to treat cannabis addiction

► Uses a combination of approaches meant to increase self-control

► In several studies, most people receiving a CBT maintained the gain from treatment, throughout the following year
Cannabis treatment: other approaches

- Motivational Enhancement Therapy (MET) has proven effective for stopping cannabis dependence.

- Interpersonal, family, and couples therapy: to treat drug use in the system in which it was developed and maintained.

- Including family is particularly useful for helping patients stay in treatment esp. adolescence, and addressing the reasons for which drug use began.
Cannabis treatment: other approaches

► Contingency management giving clients the chance to earn low-cost incentives in exchange for drug-free urine samples, are effective in stopping continued cannabis use.

► Medical treatments are in the early stages of development but oral THC combined with lofexidine has been shown to curb withdrawal symptoms.

► Various cannabis-based medications are under investigation to harness the new knowledge and therapeutic potential of the cannabinoid system.
Withdrawal management

- No specific pharmacotherapies for managing cannabis withdrawal or relapse
- Effectively managed as an outpatient, however severe dependence may require specialised assistance
- Engage in brief interventions, including relapse prevention and problem solving skills
- Consider shared care with psychologists and/or experienced AOD workers
Medications may be useful for a limited time:

► Sedative/hypnotics
  – e.g., Diazepam 5 – 10 mg qid/prn, for brief duration

► Antipsychotics (for severe agitation or psychosis)
  – e.g., Haloperidol or Atypical
Where are we so far?

- What forms of use and routes of administration of cannabis do you know?
- Can you name some adverse consequences of marijuana use?
- How does cannabis use relate to mental disorders?
- What approaches are there to treat cannabis dependence?
Break
New psychoactive substances (NPS)
New psychoactive substances are 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.

In this context, the term ‘new’ does not necessarily refer to new inventions but to substances that have been recently become available.
NPS: Are they that new?

- NPS that fall outside international drug control conventions are not a novel phenomenon
- Many of these substances were synthesized and patented in the early 1970s or even earlier
- Only recently their chemistry or process of synthesis have been slightly modified to produce effects similar to known illicit substances
The amphetamine-type stimulants (ATS) market has always been characterized by a large variety of substances.

However, NPS have rapidly emerged in this market purportedly as “legal” alternatives to internationally controlled drugs, causing similar effects to the latter, with the potential to pose serious risks to public health and safety.

The fast-paced nature of this market, the increased availability of these substances and the reports of increased and emerging use of and trade in such substances have drawn concerns among the international community as there is the potential for transnational organized criminal groups to exploit the market for these substances.
Appearance of NPS groups up to 2012

Source: UNODC questionnaire on NPS, 2012
NPS categories

- Aminooindanes
- Ketamine & Phencyclidine-type substances
- Phenethylamines
- Piperazines
- Plant-based substances
- Synthetic cannabinoids
- Synthetic cathinones
- Tryptamines
- Other substances
Six main groups of substances identified in this market:

1. Synthetic cannabinoids
2. Synthetic cathinones
3. Ketamine
4. Phenethylamines
5. Piperazines
6. Plant-based substances

A seventh group of miscellaneous substances that contain recently identified NPS which do not fit into the aforementioned groups.
Categories of NPS in the market (2014)

- Aminooindanes
- Synthetic cannabinoids
- Synthetic cathinones
- Ketamine and phencyclidine-type substances
- Tryptamines
- Piperazines
- Phenethylamines
- Plant-based substances
- Other substances
Other terms: “designer drugs,” “legal highs,” “herbal highs,” “bath salts”

► The term “designer drugs” had been traditionally used to identify synthetic substances but has recently been broadened to include other psychoactive substances that mimic the effects of illicit drugs and are produced by introducing slight modifications to the chemical structure of controlled substances to circumvent drug controls.

► “Legal highs,” “herbal highs,” “research chemicals” and “bath salts” are also common names used to refer to NPS offered as a legal alternative to controlled drugs.

► These substances are frequently labelled as “not for human consumption.”

► Ketamine is one of the oldest NPS. Its abuse was recognized in the United States since the beginning of the 1980s.
Common synthetic cathinones include 3,4 methylenedioxypyrovalerone (MDPV), mephedrone (‘Drone,’ ‘Meph,’ or ‘Meow Meow’), and methylone.

There are many others.

Much is still unknown about how these substances affect the human brain, and each one may have somewhat different properties.

Chemically, they are similar to amphetamines (such as methamphetamine) as well as to MDMA (ecstasy).
Dopamine, Norepinephrine & Serotonin have been implicated as the neurotransmitter systems involved.

The energizing and often agitating effects reported in users are consistent with other drugs like amphetamines and cocaine that raise the level of dopamine in brain circuits regulating reward and movement.

A surge in dopamine in these circuits causes feelings of euphoria and increased activity.

A recent study found that MDPV – the most common synthetic cathinone found in the blood and urine of patients admitted to emergency departments after bath salts ingestion – raises brain dopamine in the same manner as cocaine but is at least 10 times more potent.
The hallucinatory effects often reported in users of bath salts are consistent with other drugs such as MDMA or LSD that raise levels of another neurotransmitter, serotonin.

A recent analysis of the effects in rats of mephedrone and methylone showed that these drugs raised levels of serotonin in a manner similar to MDMA.

A similar surge of the transmitter norepinephrine can raise heart rate and blood pressure.

Bath salts have been marketed as cheap (and until recently, legal) substitutes for other stimulants.
Risks associated with NPS use

► An alarming surge in visits to emergency departments and poison control centres attributed to NPS

► Common presentations are cardiac symptoms and psychiatric symptoms including paranoia, hallucinations, and panic attacks

► Patients with the syndrome known as “excited delirium” from taking bath salts also may have dehydration, breakdown of skeletal muscle tissue, and kidney failure

► Intoxication from several synthetic Cathinones including MDPV, mephedrone, methedrone, and butylone has proved fatal in several instances
Risks associated with NPS use

- Early indications of high abuse and addiction potential
- In a study of the rewarding and reinforcing effects of MDPV, rats showed self-administration patterns and escalation of drug intake nearly identical to methamphetamine
- Users report intense cravings and that they are highly addictive
- May contain other, unknown ingredients with their own harmful effects
- Drug users who believe they are purchasing other drugs such as ecstasy may be in danger of receiving synthetic cathinone instead e.g., mephedrone has been found commonly substituted for MDMA in pills sold as ecstasy in the Netherlands
Summary

► The use of NPS is often linked to health problems

► NPS users have frequently been hospitalized with severe intoxications

► There have also been a number of unexplained suicides with preceding use of synthetic cannabinoids (spice)

► In addition, substances like 4 methylmethcathinone (mephedrone), methylenedioxyxpyrovalerone (MDPV), 4-methylamphetamines (4-MA) have been associated with fatalities
New psychoactive substances: prevalence
By December 2013, the number of such substances reported to UNODC reached 348,209 up from 251 such substances as of July 2012, 210 and 166 substances in 2009

The number of NPS exceeds the number of psychoactive substances controlled at the international level

The overall increase over the period August 2012-December 2013 was mostly due to new synthetic cannabinoids (50 per cent of newly identified new psychoactive substances) followed by new phenethylamines (17 per cent), other substances (14 per cent) and new synthetic cathinones (8 per cent)
Global emergence of NPS

Number of new psychoactive substances reported by country, 2008-2015

Number of substances reported

- 1
- 2 - 25
- 26 - 50
- 51 - 100
- 101 - 274
- No data available
Global emergence by NPS group

Number of new psychoactive substances reported in 2014 and the year in which those substances were first reported to UNODC

Proportion of new psychoactive substances by pharmacological effect, December 2015

- Synthetic cannabinoid receptor agonists, 35%
- Classic hallucinogens, 18%
- Dissociatives, 3%
- Stimulants, 35%
- Sedatives/Hypnotics, 2%
- Opioids, 2%
- Not yet assigned, 5%
Between 2008 and 2015, a total of 644 NPS had been reported by 102 countries and territories to UNODC.

NPS are now found in most of Europe and North America, as well as Oceania, Asia and South America and in a number of African countries.

The number of NPS on the global market more than doubled over the period 2009-2013.
New psychoactive substances & law
NPS: What is the legal situation?

- NPS are not under international control
- Many countries have established permanent control measures for some substances or issued temporary bans
- Only a handful of NPS have been reviewed by the mechanism established under the 1961 and 1971 Conventions
- NPS are also a challenge for prevention and treatment. Instead of moral panic, objective and credible information is needed
- In this respect, it is particularly important to create risk awareness among young people
- Prevention measures should also target experienced drug users
UNODC

UNODC has reviewed the appearance of NPS in global markets and issued the first global overview of information on these substances and their use as well as a list of the substances reported to it in 2012.

The 2013, 2014 – 2016 World Drug Report has also dedicated a Chapter to this issue.

On the occasion of World Drug Day on 26th June 2013, a secure online Early Warning Advisory has been launched, to assist Member States in the identification of NPS.

Other

For additional information on synthetic Cathinones, see http://www.emcdda.europa.eu/publications/drug-profiles/synthetic-cathinones, recommended by NIDA.
What was the most meaningful for you today?
What will you take away with you today?
What did you enjoy the most?
How will you use this information?
Post-assessment
Thank you for your time!
End of module 1