

Drug Abuse and Oral Health



What I am Going to Talk about

- **Illicit drugs**
- **Oral manifestations of substance abuse**
- **Dental care in substance abuse**

Drug Abuse Prevalence

- One of the world's health problems.
- In 2009 , 200 million 15–64-year-olds around the world reported using illegal drugs.
- In Iran (2002) drug abuse has increased at a growth rate three times as great as population growth rate.

Direct Consequences of Drug Abuse

- Multiple physical problems such as cardiac crisis, respiratory depression, cirrhosis, nephropathy, blood-borne infections, injury-associated disability & mental disorders.
- Addicts usually ignore their health problems and seek health care only at advanced stages of disease with severe symptoms; this may complicate the treatment procedure.

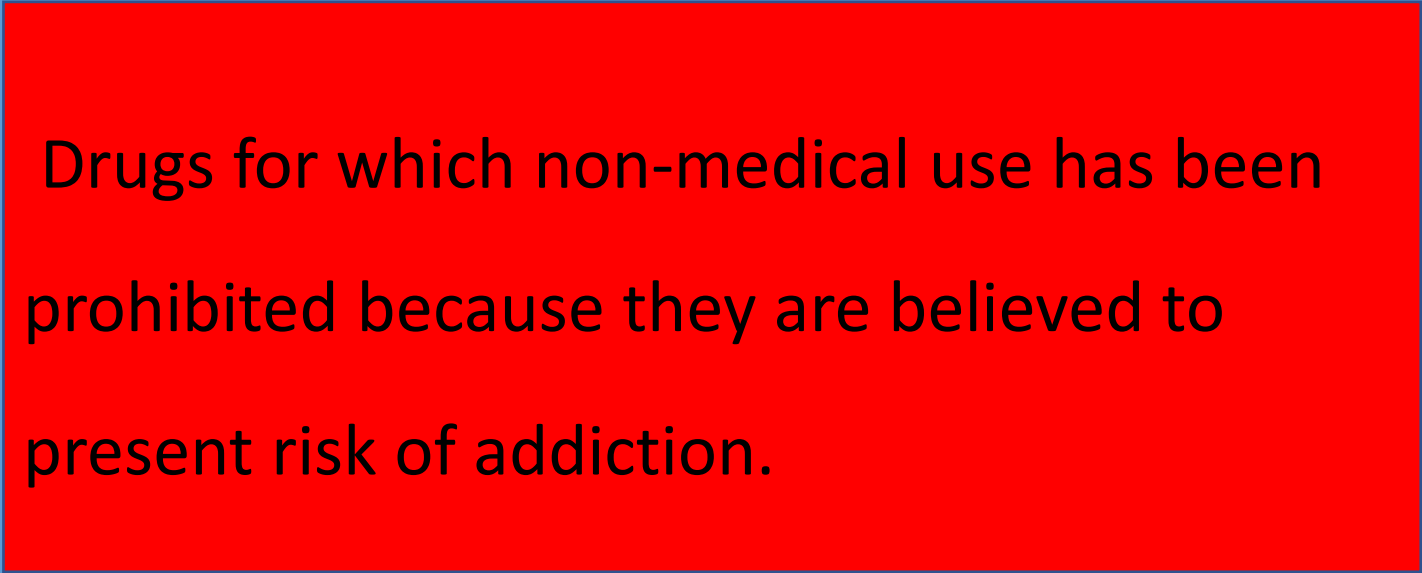
Indirect Consequences of Drug Abuse

- Reducing working time, raising health care costs , violence, crime.
- Illegal drug addiction and consequences caused more than 800,000 global deaths in 2003.

Terminology



Illicit drugs



Drugs for which non-medical use has been prohibited because they are believed to present risk of addiction.

Substance abuse

Recurrent use of a large amounts of a substance over the 12 months with subsequent adverse consequences (failure to fulfill a role at work , legal & inter-personal problems).

Dependence or Addiction

Tolerance & withdrawal in addition to certain patterns of drug use & uncontrollable need for use of the substance despite adverse consequences.

Withdrawal

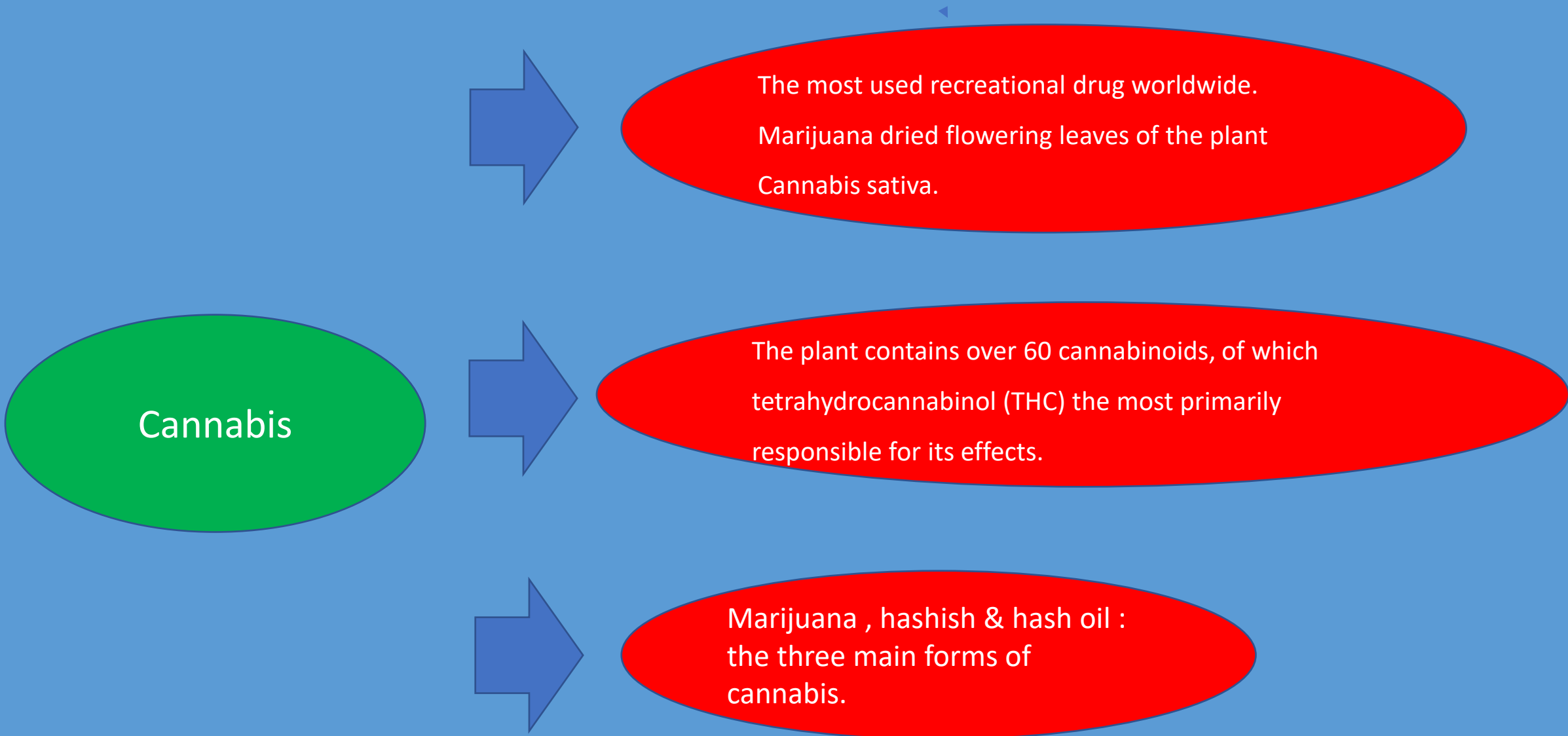
Characteristic syndrome emerging upon abstinence from a habitually used substance.

Tolerance

Need for increased amounts to achieve the desired effect , diminished effect with continued use of the same amount.



Cannabis



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graph LR; A([Cannabis]) --> B([The most used recreational drug worldwide. Marijuana dried flowering leaves of the plant Cannabis sativa.]); A --> C([The plant contains over 60 cannabinoids, of which tetrahydrocannabinol (THC) the most primarily responsible for its effects.]); A --> D([Marijuana , hashish & hash oil : the three main forms of cannabis.]);
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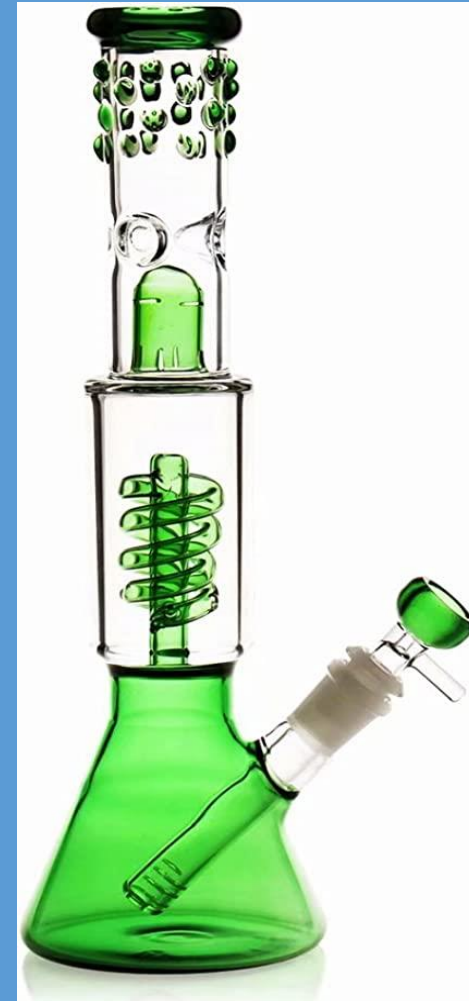
Marijuana contains 0.5–5% THC ,
prepared as a 'joint' for smoking.
hand rolled, filter less cigarette
or through a water pipe, referred
to 'bong'. Also, can be
incorporated in foods such as
cookies.



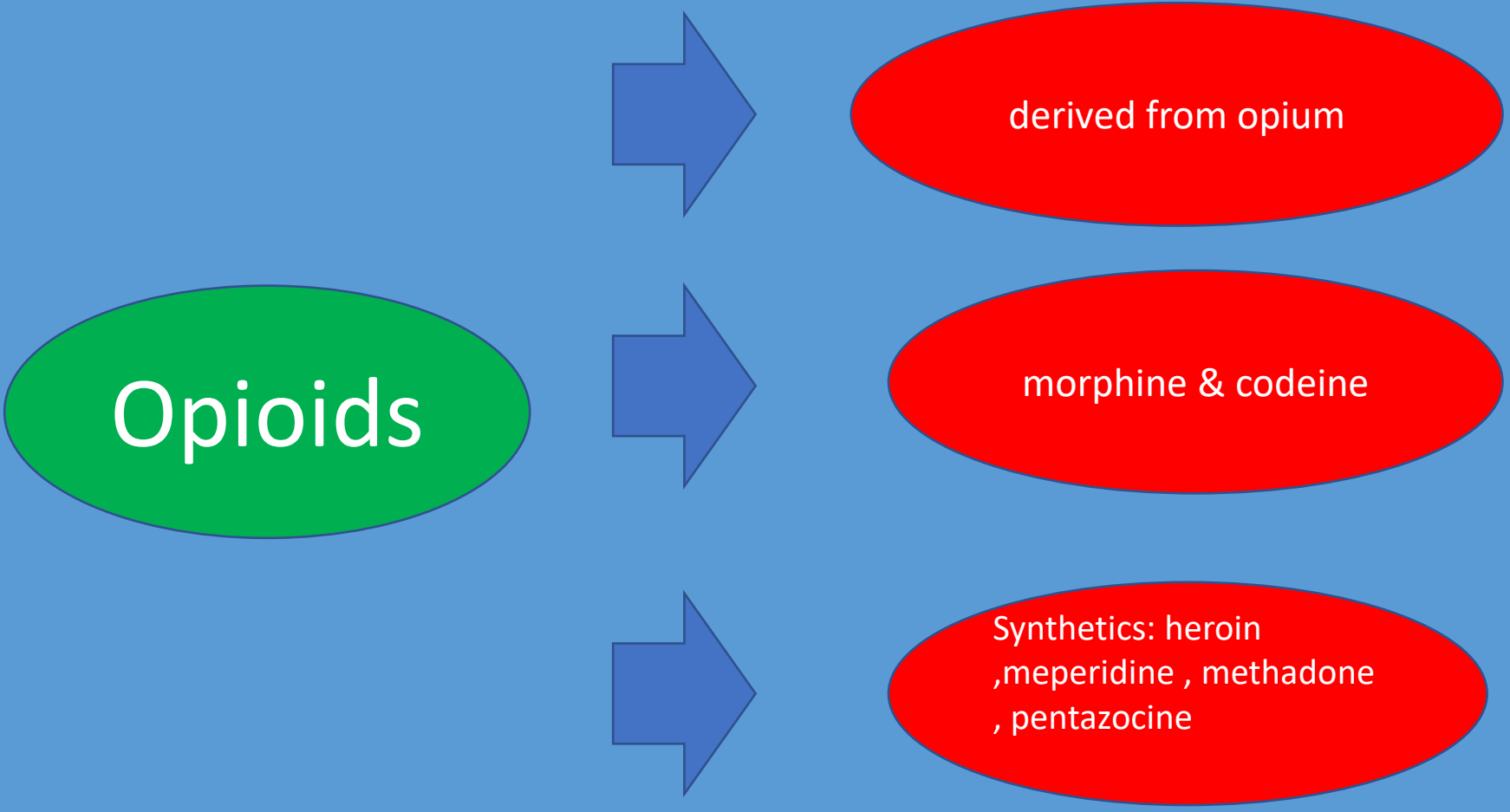
Hashish normally contains 2–20%
THC ,formed of the flower heads .



Hash oil extracted from
hashish , consisting 15–50%
THC.



Opioids



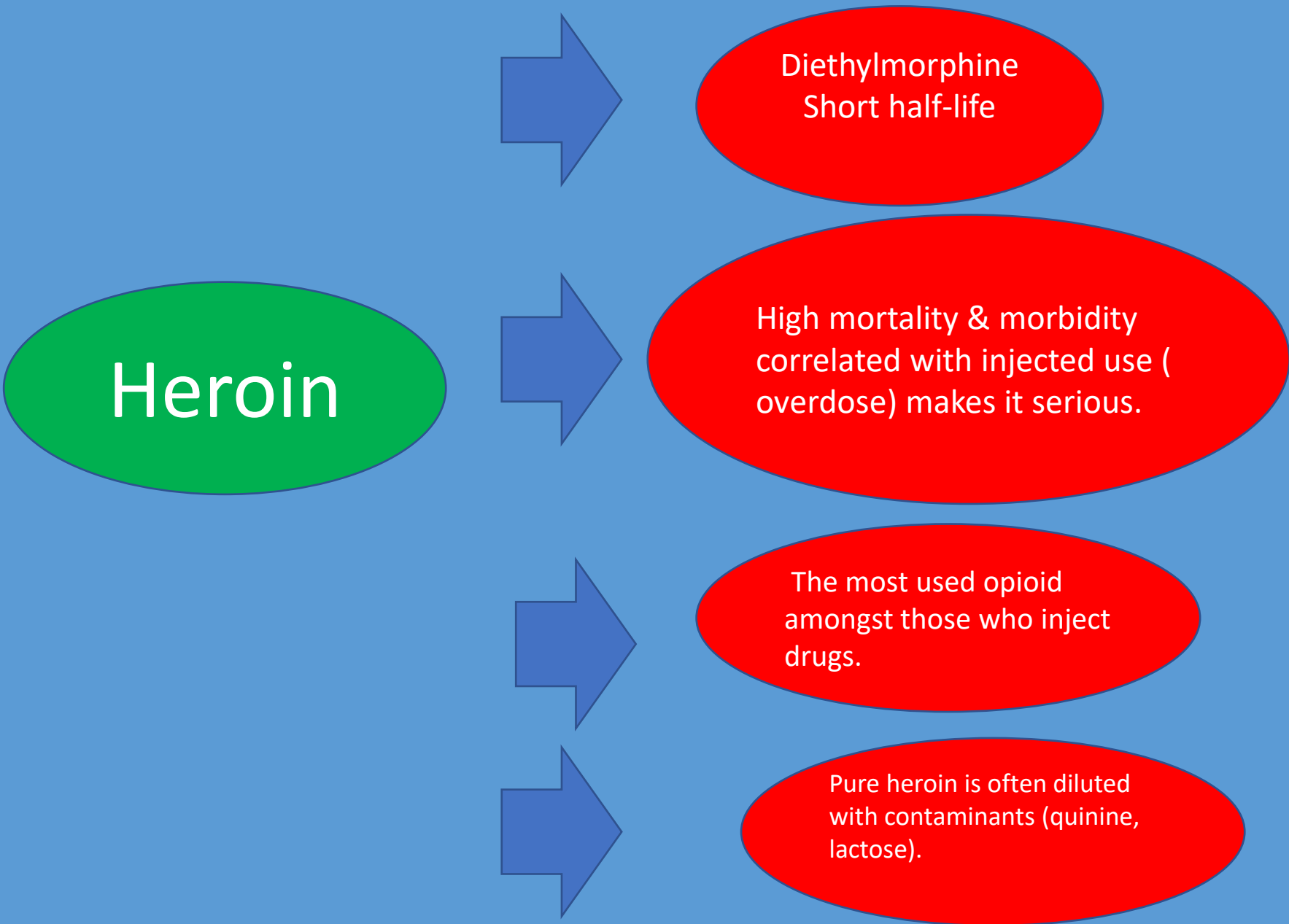
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graph LR; A([Opioids]) --> B([derived from opium]); A --> C([morphine & codeine]); A --> D([Synthetics: heroin, meperidine, methadone, pentazocine]);
```

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, meperidine , methadone
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Heroin



```
graph LR; A([Heroin]) --> B([Diethylmorphine<br/>Short half-life]); A --> C([High mortality & morbidity<br/>correlated with injected use (<br/>overdose) makes it serious.]); A --> D([The most used opioid<br/>amongst those who inject<br/>drugs.]); A --> E([Pure heroin is often diluted<br/>with contaminants (quinine,<br/>lactose).]);
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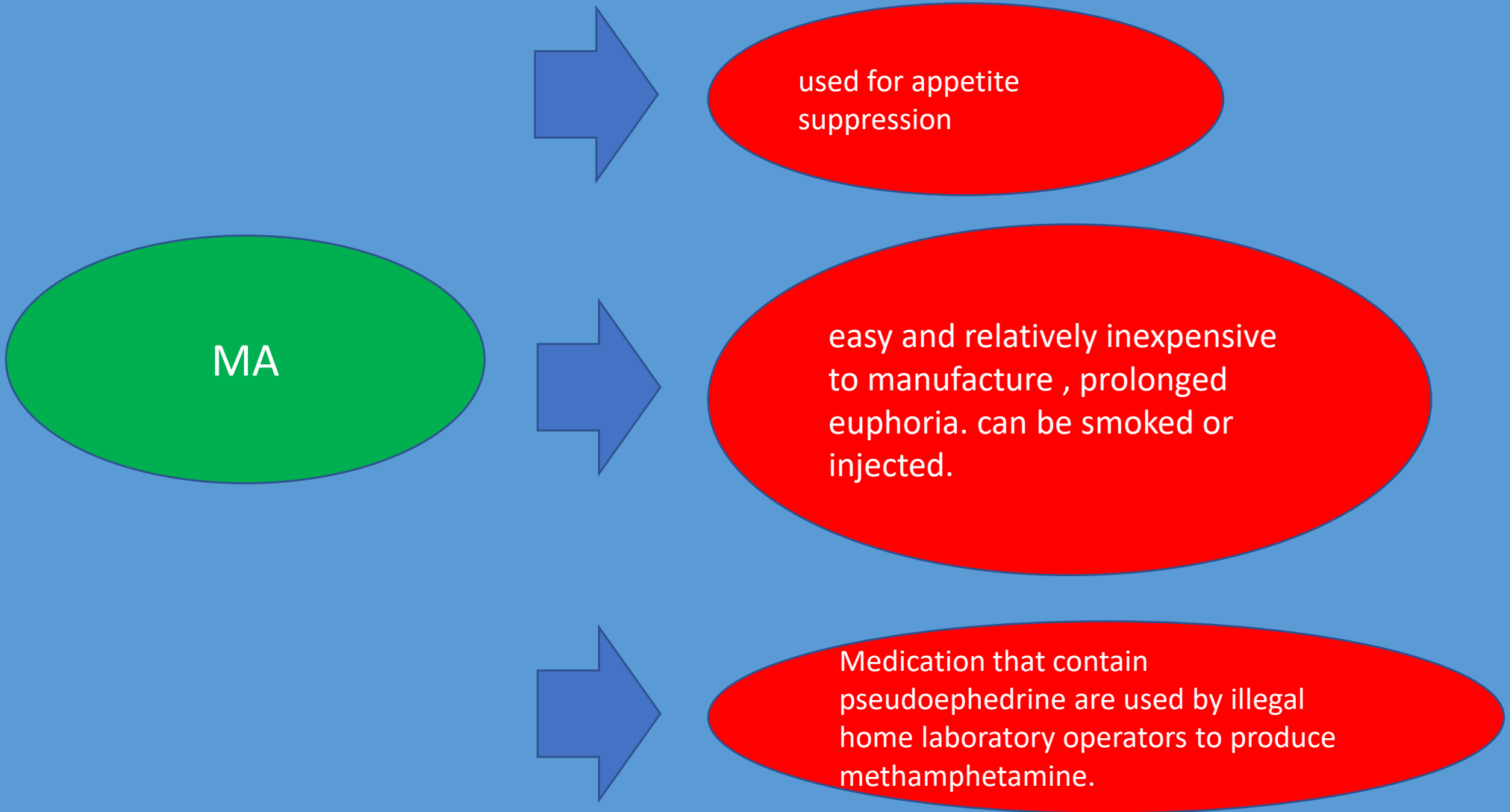


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graph LR; A([Amphetamine]) --> B([treat narcolepsy and attention deficit hyperactivity disorder]); A --> C(['Crystal' or 'ice' : illegally produced form of amphetamine and the most abused widely.]);
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Amphetamine

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'Crystal' or 'ice' : illegally
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MA

The diagram features a central green oval labeled 'MA' on the left. Three blue arrows point from this oval to three red ovals on the right. The top red oval contains the text 'used for appetite suppression'. The middle red oval contains the text 'easy and relatively inexpensive to manufacture , prolonged euphoria. can be smoked or injected.'. The bottom red oval contains the text 'Medication that contain pseudoephedrine are used by illegal home laboratory operators to produce methamphetamine.'.

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Cocaine

- Cocaine is a naturally alkaloid with local anesthetic properties derived from the leaves of the Erythroxylon coca bush, a plant in South America.
- In the 1880s, cocaine was used as a local anesthetic for ophthalmic surgeries.



```
graph LR; A([Epidemiology]) --> B([The number of marijuana users increased. Some countries have made the use of marijuana legal.]); A --> C([The use of prescription opioids for non-medical reasons is currently one of the fastest growing dimensions of drug abuse.]); A --> D([Methamphetamine use is spreading at alarming rates.]);
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Epidemiology

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```
graph LR; A([Mechanism of action]) --> B([Cannabis : modulation of CNS receptors (CB1 and CB2).]); A --> C([Cocaine: potent sympathomimetic & vasoconstrictor properties.]); A --> D([Amphetamine: serotonin neurotransmitters in the CNS.]); A --> E([Cocaine & amphetamine: NE neurotransmission in CNS  
All (+opioids) increase dopamine levels in CNS.]);
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Mechanism of action

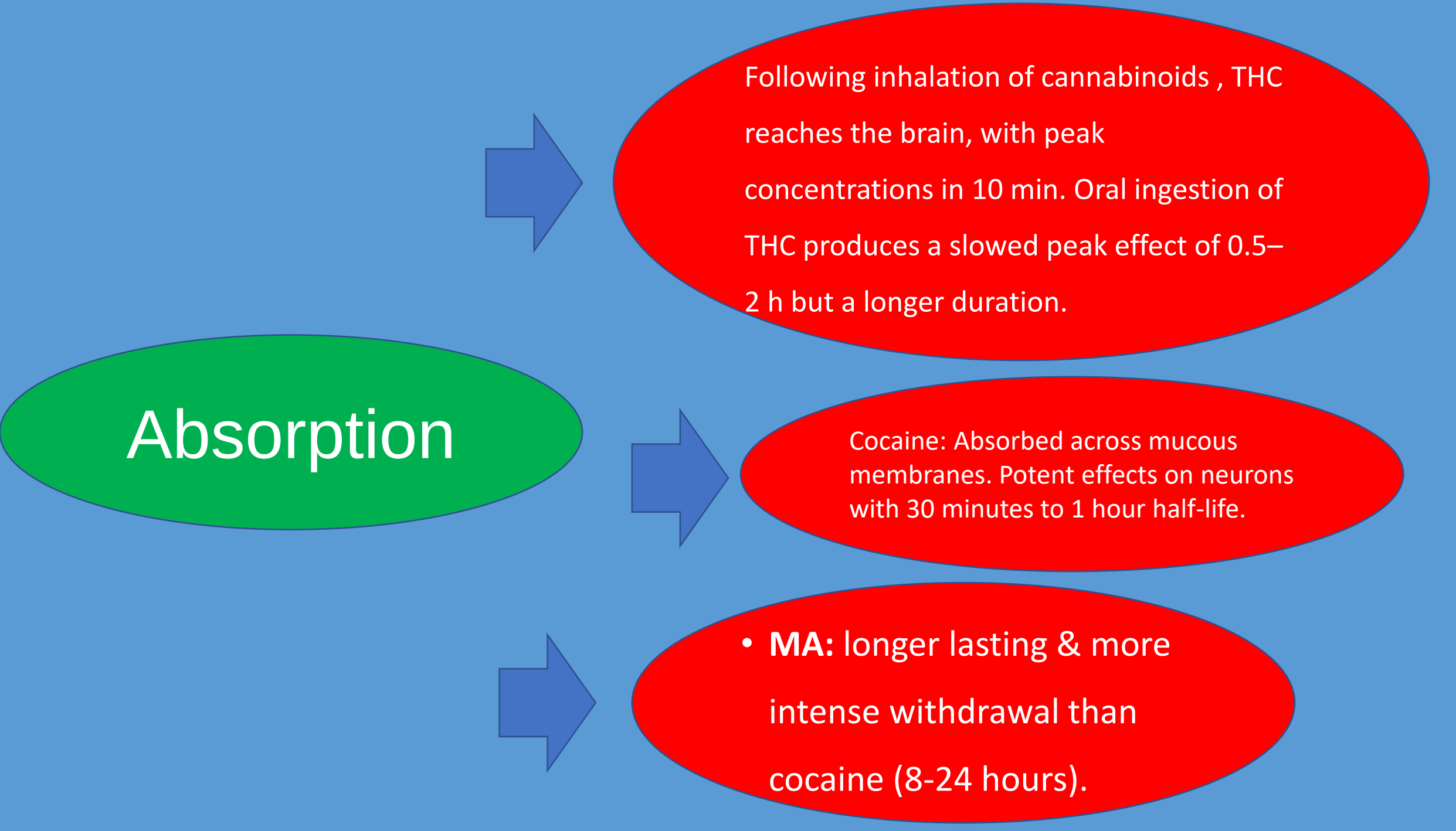
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Absorption



```
graph LR; A([Absorption]) --> B([Following inhalation of cannabinoids , THC reaches the brain, with peak concentrations in 10 min. Oral ingestion of THC produces a slowed peak effect of 0.5–2 h but a longer duration.]); A --> C([Cocaine: Absorbed across mucous membranes. Potent effects on neurons with 30 minutes to 1 hour half-life.]); A --> D([• MA: longer lasting & more intense withdrawal than cocaine (8-24 hours).]);
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- **MA**: longer lasting & more intense withdrawal than cocaine (8-24 hours).

Psychoactive
Effects
(All: euphoria)



Cannabis : on cognition, memory ,
motor coordination , anxiolytic,
sedative, analgesic , stimulates
appetite.



Opioids: Decrease pain perception,
sedation , constipation, anorexia.



Cocaine : Sense of well-being , restlessness ,
anorexia , agitation , delusions , sexual desire ,
blurred vision, aggressive behavior. deficits in
cognition, emotional instability , depression.



MA: Hyperactivity , alertness, insomnia ,
Paranoia, agitation, mood disturbances,
violent behavior , headache, anxiety , brain
damage, convulsions, depression and
psychosis.

Systemic effects

Cannabis: Tachycardia, hypertension, cardiac ischemia , chronic bronchitis, cough , sputum & risk of respiratory infections.

Opioids: Respiratory depression & vomiting.
Additives in street drugs can cause permanent damage to CNS.

Cocaine: Increased respiration rate ,tachycardia , BP↑, psychiatric state like schizophrenic.

MA: increased respiration ,tachycardia ,
Psychotic symptoms very similar to schizophrenia

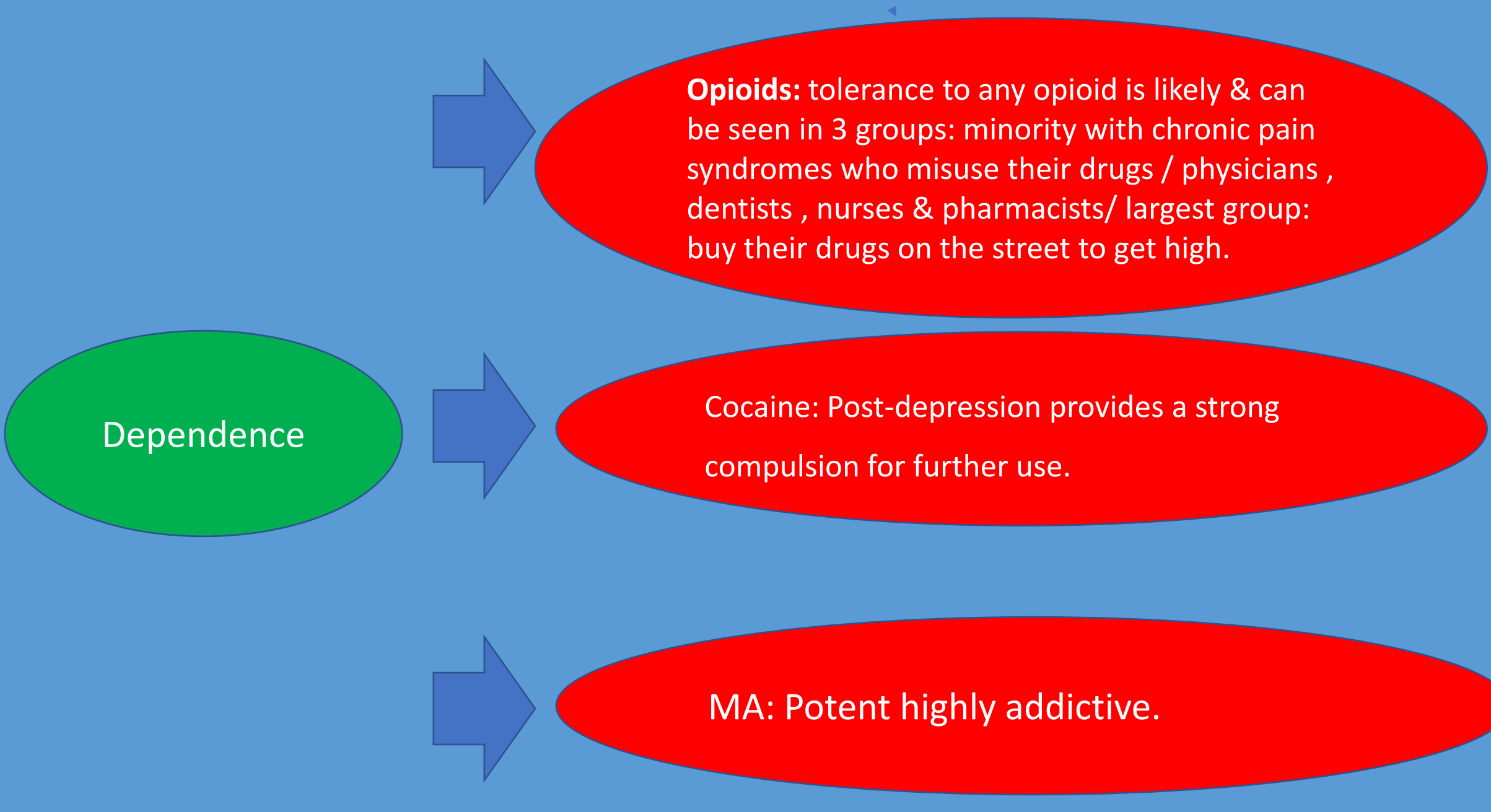
Acute
Intoxication
(Overdose)

Cannabis: anxiety, panic and paranoia , slowing of reaction time, increased accident risk, difficulty in concentrating , altered sense of time & distance perception , destabilize schizophrenia is in remission.

Cocaine : overdose can be life-threatening (MI , stroke , respiratory arrest).

Opioids: more frequent & dangerous with more potent drugs such as fentanyl which is 80-100 times more powerful than morphine. IV overdose can lead to bradycardia , drop in body temperature & lack of responsiveness to external stimulation. Emergency treatment includes support of vital signs , use of respirator & injection of a reversal (naloxone).

MA: Increased risk of mortality due to suicide and overdose.



Dependence

Opioids: tolerance to any opioid is likely & can be seen in 3 groups: minority with chronic pain syndromes who misuse their drugs / physicians , dentists , nurses & pharmacists/ largest group: buy their drugs on the street to get high.

Cocaine: Post-depression provides a strong compulsion for further use.

MA: Potent highly addictive.

Withdrawal

```
graph LR; A([Withdrawal]) --> B([From opiates are not life-threatening (GI , muscle cramps ,rhinorrhea, irritability , restlessness, anxiety, sweating, insomnia and drug cravings).]); A --> C([Cannabis: 12–15% of users will become chronic users. Tolerance can develop , thereby leading to a withdrawal syndrome.]);
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The homemade production of desomorphine by the combination with iodine, soda, red phosphorus, gasoline and Hcl produces an injectable liquid.

Desomorphine : “Croc” “: black & green , flaking skin like that of a crocodile



Cocaine can also be smoked, by converting cocaine to 'crack', where it is mixed with sodium bicarbonate.



This highly addictive form is heated and smoked, where 'crack' derived its name from the popping sound made on heating.



Oral Manifestations Of Substance Abuse

- Oral health problems are among the most prevalent health problems associated with drug addiction.
- Drug abuse has direct consequences for oral health , can exacerbate oral problems indirectly through its adverse effects on the users' behavior and lifestyle.

Poor Oral Health

- Personal neglect
- Poor oral hygiene
- Psychological factors such as depression, anxiety and lack of motivation

leading to delaying dental treatment.

1-Xerostomia

- As the most significant etiological factor leading to the deterioration of oral health in cocaine and methamphetamine users.
- Heroin addiction also is associated with xerostomia.
- Xerostomia leads to burning mouth, taste impairment, eating difficulties, caries , candidiasis & periodontal diseases.

2- Dental Caries

- Smooth surface (buccal & cervical) and anterior caries (cannabis , heroin , methadone)
- Methadone syrup is sweetened for palatability (Increased presence of residual roots & rapid tooth destruction with aggressive, widespread caries in MMT).
- In opiate drug users also , tooth loss are common.
- Heroin users : caries , covering a wider area than cervical , caries in these patients is darker.



3- Increased Risk of Oral cancer

- Marijuana smoking is not an independent risk factor for oral cancer development & tobacco usually forms a part of marijuana smoking mix.
- In cannabis smoke contains 50% more carcinogenic hydrocarbons compared to tobacco smoke.
- Insufficient evidence exists to support a theory of a higher prevalence of oral cancer specifically in opioid abusers.

4- Gingival Recession

- Cocaine is often placed directly onto the gingiva to test the purity so gingival recession & erosion of the facial aspects of the maxillary teeth may result from persistent rubbing of the powder over these surfaces.
- Pure cocaine has a pH of 4.5 which can disintegrate the enamel and dentine when direct placement in the oral cavity.



Cocaine-Associated Rapid Gingival Recession and Dental Erosion. A Case Report

Yvonne L. Kapila and Hoshang Kashani*†*



Figure 1. Preoperative clinical view of the recession and cervical erosion on the buccal surfaces of the maxillary and mandibular anterior and maxillary right first premolar teeth.

5- Bruxism & Attrition

- Predominate finding in opioid & cocaine dependents , thought to be due to the increased incidence of psychological problems.
- Tenderness in the surrounding musculature likely due to the changes in dopaminergic neurotransmission in the CNS.
- Bruxism in MA users, due exhibit extremely high level of energy , the increase in neuromuscular jaw activity which result in tooth sensitivity.

6- ONJ

- Active ingredients of croc result in a high incidence of osteonecrosis of the jaw.
- In the vast majority of cases tooth removal was the trigger for the development of ONJ, where bone exposure can occur up to 12 months after the extraction.
- Methamphetamine's effect on soft tissues and vascularization or the effect of inhaled toxic on the healing socket.

- Sacco R et al. The role of illicit drugs in developing medication-related osteonecrosis (MRONJ): a systematic review. Br J Oral Maxillofac Surg. 2021 :

There was a total of 101 patients with ONJ attributed solely to illicit drug consumption. The most common site was the maxilla (n=54). The most common related drug was desomorphine, followed by cocaine, methamphetamine, anabolic steroids, and hydrocodone/acetaminophen.

Osteonecrosis of
the maxilla related
to long-standing
methamphetamine
abuse

Fig. 1 Patient at first presentation showing an icterus (a) and wide osteonecrosis of the upper jaw (b)

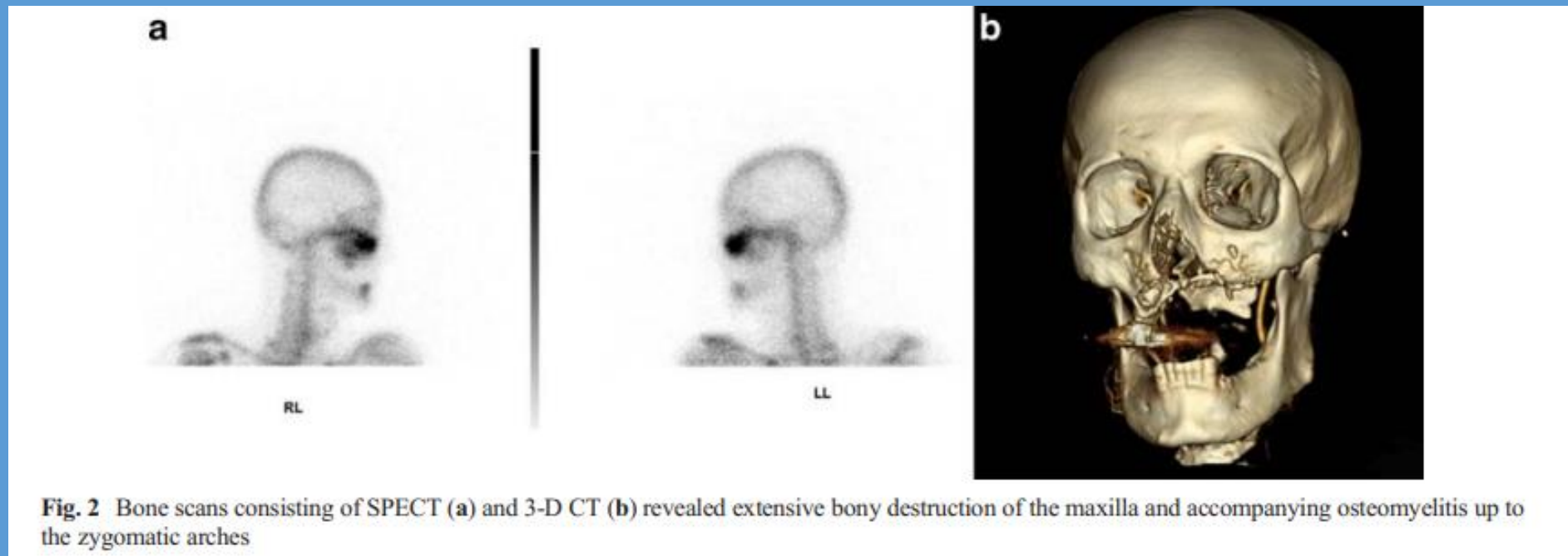
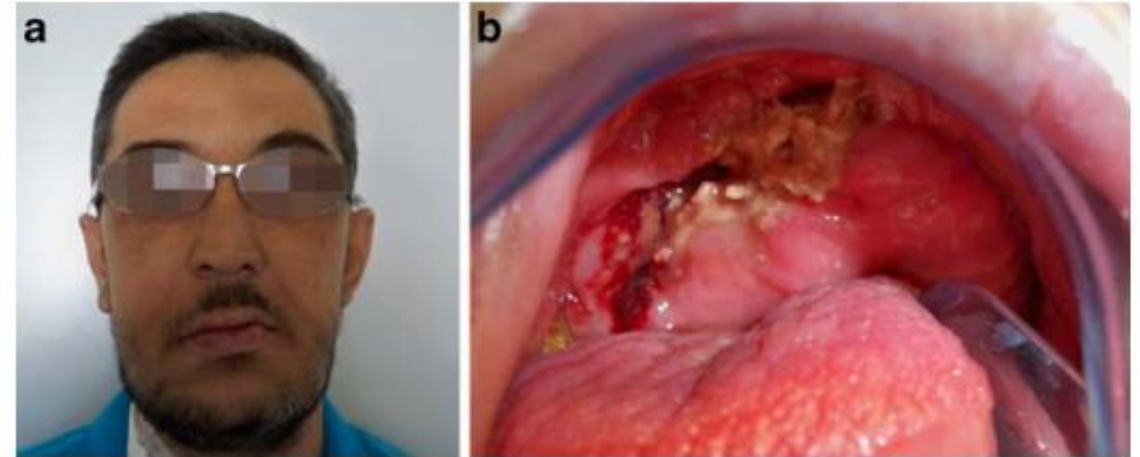
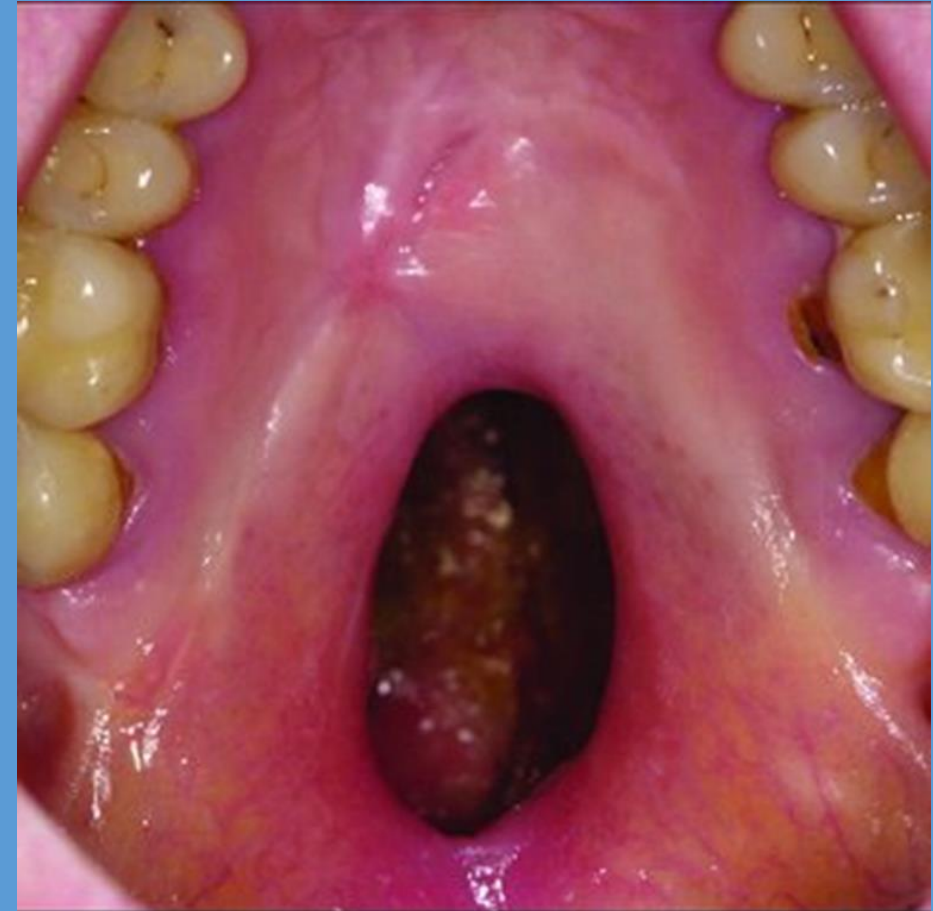


Fig. 2 Bone scans consisting of SPECT (a) and 3-D CT (b) revealed extensive bony destruction of the maxilla and accompanying osteomyelitis up to the zygomatic arches

7- Palatal Perforation in Cocaine Users

- Epistaxis, rhinitis, changes in sense of smell , nasal crusting and chronic sinusitis , >50% of users.
- Vasoconstrictor, resulting in ischemia and necrosis of the tissues , can lead to complications with speech, eating and drinking.



8- Meth Mouth

- Appearance of teeth : ‘blackened, stained, crumbling or falling apart.
- The term methamphetamine-induced caries (MIC) to describe this rampant caries.
- “Meth mouth” : severe xerostomia+periodontitis severe dental caries+ fractured teeth.

Figure 2. A 60-year-old male presenting with “meth mouth”





Figure 16.1 Methamphetamine mouth, front view.



Figure 16.2 Methamphetamine mouth, side view.

The Pattern of Caries

- Inhaled or smoked MA is acidic and has direct corrosive effects on oral tissues.
- Users who inject MA have been shown to have increased dental disease.
- Instead of drinking water, MA users continually consume plenty of sweet drinks.
- The teeth are usually in such disrepair that extraction is the result.



- Cervical decay progress apically and occlusally, undermining enamel.
- Whole fracture of teeth commonly result of bruxism.





SUBSTANCE ABUSE

& Dental Care

Talking with Patient

- Beginning with a private presentation of the findings, the practitioner should address the possibility of drug abuse.
- If the patient admits to having a substance abuse problem, the next step is to explain the oral consequences of drug.
- If the patient is reluctant to admit , the only option is to provide the best oral care possible.
- Discussing the situation with family members to encourage users to seek professional help may be the best course of action.

Thorough Review of Medical History

- Conversations could begin with, “How did your teeth get to be this way? Normally, we don’t see this kind of decay and/or tooth damage very often. It usually happens if someone drinks excessive amounts of sugary soda or takes drugs.”
- Wearing of long-sleeved shirts during summer often indicate parenteral MA abuse.
- Patients who frequently miss appointments without good reasons or mood swings, violence , paranoia, malnourished appearance may be MA abusers.



Figure 1 Frontal intra-oral view of the patient showing 24 residual roots, four residual crowns with leathery and rampant brown carious lesions extending to the gums. Dental plaque and inflamed soft tissue can also be seen.



Figure 2 Preoperative panoramic radiograph showing that most of the teeth are residual roots and almost all pulp cavities are exposed. Perforations of the pulp floor can be seen in some molars.



Figure 3 Frontal intra-oral view at the completion of endodontic treatment, showing that the residual roots and crowns have been filled with composite resin, cervical calculus removed and soft tissue inflammation eliminated.



Figure 4 Postoperative panoramic radiograph. Note that all the root canal fillings are dense and of appropriate length, and there is no large radiolucency in the apical areas of the teeth.



Figure 5 Occlusal view of the overdentures showing that the relationship between upper and lower teeth is appropriate.



Figure 6 Frontal view of the post-prosthetic smile showing that the patient was satisfied with the aesthetic and functional results.



Figure 7 Frontal intra-oral view of 1-year follow-up. Note that five fillings fell out as a result of secondary caries. However, the rampant caries has been controlled.

Some Points about this Case

- To prevent anxiety , short visits were arranged and for all treatments he was accompanied by family members at doctors' request.
- The key to successful dental treatment is cessation of MA use. The financial difficulties and psychosis that result from chronic MA abuse, make it difficult to complete the dental treatment and leave teeth extraction as the only treatment modality.

Preventive Treatments & Postoperative Care

- A signed consent form, for ill effects of future drug abuse on restorative dental procedures, should be obtained.
- Patients should be counseled to drink eight to ten glasses of water daily while avoiding soft drinks.
- Basic oral hygiene skills must be reviewed.

Table 4. Preventive regimens based on individual caries risk as outlined by the CAMBRA protocol⁴²

Risk level	Antimicrobials	At-home fluoride	Professional CRA and F ⁻	Xylitol and/or baking soda
High	Chlorhexidine 0.12% rinses for 1 min daily for 1 week each month	Rx 5000 ppm fluoride toothpaste twice daily	CRA every 6 months and fluoride varnish every 6 months	Xylitol gum or mints, 8 g daily

Management of Xerostomia

- Salivary substitutes, sugarless gums or pilocarpine.
- Alcohol-containing mouthwashes should also be avoided in these individuals.
- Users often administer hypnotics such as diazepam and zolpidem to transition off the euphoric effect of cocaine. It is well-established that these medicines also cause xerostomia.

Anxiety

- Cannabis & cocaine can experience acute anxiety that can worsen in association with a stressful event such as a dental visit.
- Anxiety may require treatment with benzodiazepines.
- IV sedation with a benzodiazepine or general sedation should be avoided for MA users.

Local Anesthesia

- EP in local anesthetic can exacerbate tachycardia caused by cannabis.
- Lidocaine in combination with cocaine has may increase convulsion.
- Synergistic effect of cocaine or MA with EP containing local anesthetics increases the risk of acute hypertension, CVA and MI.
- Patients who are “high” on cocaine should not receive any local anesthetic containing EP at least 6 hours after the last use , 24h for intoxication with MA.
- Use of EP-impregnated retraction cord should be avoided.

Dental Pain

- Opioid use can obscure dental pain, seeking dental treatment only when in extreme pain and dental disease is subsequently more advanced.
- Dental professionals should avoid narcotic analgesics and recommend instead NSAIDs.
- Often because of the number of compromised teeth and referred pain, pulp testing may be unreliable, leading to a misdiagnosis of individual tooth prognoses.

- Drug abusers may try to obtain drugs by demanding pain medication for a dental problem.
- The opioid abuser may claim to be allergic to NSAIDs.
- Abuse of N2O inhalation is found among dentists.
- Even by injecting drugs directly into gingiva or teeth, they want to mask pain and delaying appropriate treatment.

Treatment Plan

- Dental management of substance drug abusers is complex. They might have underlying psychological problems; The dentist should not provide extensive care until the patient demonstrates an interest in care for the dentition.
- Psychosis and paranoia associated with chronic MA use can persist for years after the cessation of the habit, which can impact on patient management.

Bloodborne Infections

- Injecting drug users are at increased risk of blood-borne viruses & IE.
- Crack-cocaine smoking produces burns and sores on the lips, face, and inside of the mouth which may increase the risk transmission of HIV.
- Skin tracks (chronic inflammation from multiple injections).

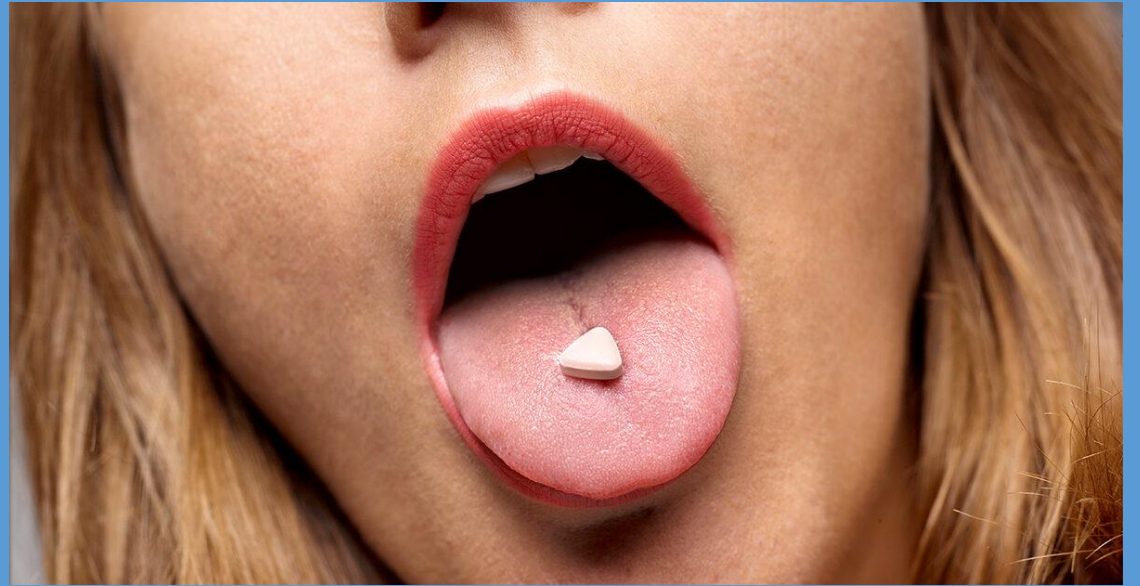


About Rehabilitative Treatments

- The loss of posterior support, occlusal trauma, loss of VD , lack of suitable abutment teeth & xerostomia will create challenges in the retention and stability of dentures.
- Methamphetamine use has been shown to chronically lower bone matrix dentistry (BMD) and common concurrent smoking addiction increases implant failure rates.

Oral Health Problems Associated with Hallucinogens

- Hallucinogens such as ecstasy and LSD (Lysergic acid diethylamide) result in several complications including dry mouth and malnutrition caused by drug-induced anorexia.
- Clenching and TMJ tenderness are frequently reported by ecstasy.
- High intake of carbonated drinks to overcome the sensation of dry mouth after drug-taking may lead to caries and erosion.
- Topical use of ecstasy may result in oral-tissue necrosis and mucosal fenestration.



Oral Health Problems Associated with Club Drugs

- Including methylenedioxymethamphetamine (MDMA) & ketamine : chemical substances used by young people in recreational setting.
- Dry mouth and bruxism.
- A high rate of traumatic orofacial injuries occurs among drug abusers, ones such as fractured teeth or tooth loss following accidents or fights.

Conclusion

- Illicit drug use is a significant public health problem, dentists likely to encounter users.
- Comprehensive dental care programs should be integrated into general health care services.
- Dental professionals are in a unique position to help in the early detection and intervention of undisclosed abuse.
- Most patients are concerned about the cosmetic aspects of their dental disease which may provide a stimulus.
- Once the patient successfully completes a drug rehabilitation program, functional and aesthetic dental reconstruction is beneficial to improve their self-esteem and help them return to normal life.

Selected References

- 1- Wang P et al. **Comprehensive dental treatment for "meth mouth": a case report and literature review.** J Formos Med Assoc. 2014
- 2- Teoh L et al. **Oral manifestations of illicit drug use.** Aust Dent J. 2019
- 3- Nassar P et al. **Cocaine and methamphetamine: Pharmacology and dental implications.** Can J Dent Hyg. 2020
- 4- Shekarchizadeh H et al. **Oral Health of Drug Abusers: A Review of Health Effects and Care.** Iran J Public Health. 2013

Pharmacotherapy for Opiate Abuse and Dependence

- Methadone—is similar to morphine and is used in addiction detoxification and opioid maintenance therapy (OMT) programs to reduce the withdrawal symptoms for patients addicted to heroin or narcotics.
- Buprenorphine - sublingual tablets —a narcotic but is a partial agonist with a long half-life, features that reduce its abuse potential. can be used for both OMT and detoxification. In detoxification, it can be tapered comfortably on a symptom-based schedule.
- Naloxone —An opioid antagonist used for the reversal of opioid depression.

Pain Management

- There is significant individual variation in the experience of acute pain in dental patients, and patients with SUDs may need more medication than might have been anticipated (due to increased levels of tolerance for analgesics).
- Inadequately managed pain, with its attendant anxiety, is a known risk factor for relapse, and is to be avoided.
- Premedication with ibuprofen, 600–800mg, 1–2 hours before the procedure, has been demonstrated to lower postoperative pain and to result in a decreased need for opiates. The administration of a long-acting anesthetic (such as bupivacaine) immediately following the procedure may also be of benefit in pain control.

- The undertreatment of pain in patients on OMT remains a serious problem. In cases of acute pain associated with surgery, trauma, or invasive dental treatment, physicians and dentists often and incorrectly assume that the maintenance dose of methadone or buprenorphine will also relieve any pain.
- The daily dose of OMT does not provide adequate analgesia for acute pain. Maintenance patients develop full tolerance to the analgesic effects of the maintenance dose of methadone.





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