Nicotine toxicity

Lab 6

Assist. Lecturer:

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Nicotine

- Nicotine is a highly **addictive chemical** found in **cigarettes, chewing tobacco and vaping** products. Nicotine is **the main reason** why it is so hard to quit smoking.
- After nicotine is absorbed into the bloodstream, it makes its way to the brain. Within seconds of using tobacco, nicotine causes **the release of dopamine** in the brain, which **gives people a good feeling**.
- Over time, the brain begins to **crave that feeling from nicotine** and people need to use more and more tobacco to get that same good feeling

Types of Tobacco Use

- Cigarette Cigar
- Hookah
- Pipe
- Chewing Tobacco/Dip
- Dissolvable Tobacco
- Snuff

- **Uses**
- **Nicotine is a stimulant of the central nervous system, and is abused widely all over the world in the form of inhalation (cigarette, cigar, pipe), nasal insufflation (snuff), or chewing.**
- **Nicotine is also used as an insecticide.**

Nicotiana tabacum

- **Mode of Action**

1- Nicotine binds stereo-specifically to select acetylcholine receptors (nicotine receptors).

These receptors are present throughout the body, particularly in the autonomic ganglia, adrenal medulla, central nervous system, spinal cord, neuromuscular junctions, and chemoreceptors of carotid and aortic bodies.

- **In the CNS, the highest concentration of nicotine receptors is found in the limbic system, midbrain, and brainstem.**

- **2. By acting directly on nicotine receptors in endocrine glands, as well as by stimulating neurohumoral pathways in the CNS, nicotine enhances release of catecholamines, vasopressin or antidiuretic hormone, growth hormone, ACTH, cortisol, prolactin**
- **3. Nicotine suppresses appetite while increasing basal energy expenditure, resulting in weight loss.**
- **4. Habitual use of nicotine by women results in decreased oestrogen levels (due to enhanced hydroxylation of oestradiol), thereby increasing the risk of osteoporosis.**

- **Clinical (Toxic) Features**
- **1. Acute Poisoning:**
- **a. Early Effects (15min to 1 hour)**
- **GIT: Nausea, salivation, vomiting, abdominal pain.**
- **CVS: Tachycardia, hypertension.**
- **RS: Tachypnea, bronchorrhoea.**
- **CNS: Agitation, anxiety, sweating, headache, blurred vision, confusion, vertigo, tremor, ataxia, muscle fasciculations, convulsions.**

- **b. Delayed Effects (after1 hour)**
- **GIT: Diarrhea.**
- **CVS: Bradycardia , arrhythmias, hypotension, shock.**
- **RS: Hypoventilation, apnea.**
- **CNS: lethargy, weakness, hyporeflexia , paralysis, coma.**
- **Death may occur, especially in the case of ingestion of cigarettes (accidentally) by children, or exposure to insecticidal nicotine.**

- **2. Chronic Poisoning (Addiction):**
- **Nicotine dependence is the most widely prevalent and deadly of all substance dependencies.**
- **The dependence-producing effects of nicotine appear to be modulated by dopamine which s increased in smokers. Nicotine also increases noradrenaline, adrenaline, and serotonin levels.**

- **Health consequences of tobacco use:**
- **Lung cancer.**
- **Non-pulmonary cancers: Mouth, larynx, esophagus, stomach, liver, pancreas, bladder, uterine cervix, breast, brain.**
- **Respiratory diseases:, bronchitis, asthma, pneumonia.**
- **Cardiovascular diseases: Coronary heart disease, hypertension, arterial thrombosis, stroke.**
- **Other conditions: Peptic ulcer, osteoporosis, Alzheimer's disease.**

- **Treatment**
- **1. Acute Poisoning**
- **Mild overdose (with spontaneous vomiting) requires only observation for 4 to 6 hours, after which the patient can be discharged.**
- **Serious overdose must be treated as follows:**

a. **Decontamination by stomach wash. Activated charcoal is effective and must be administered in the usual manner.**

In cases of dermal exposure (e.g. wet tobacco leaves), clothing should be removed, and skin thoroughly washed.

B-Symptomatic and supportive measures:

- **Benzodiazepines for convulsions.**
- **Atropine for bradycardia.**
- **IV fluids and vasopressors (dobutamine or noradrenaline) for hypotension.**
- **Respiratory compromise is managed by oxygen, intubation, and positive pressure ventilation.**

- **2. Chronic Poisoning (Addiction)**

a. Nicotine replacement therapy:

- **Nicotine gum (Polacrilex): The first nicotine preparation that was made available for use is**

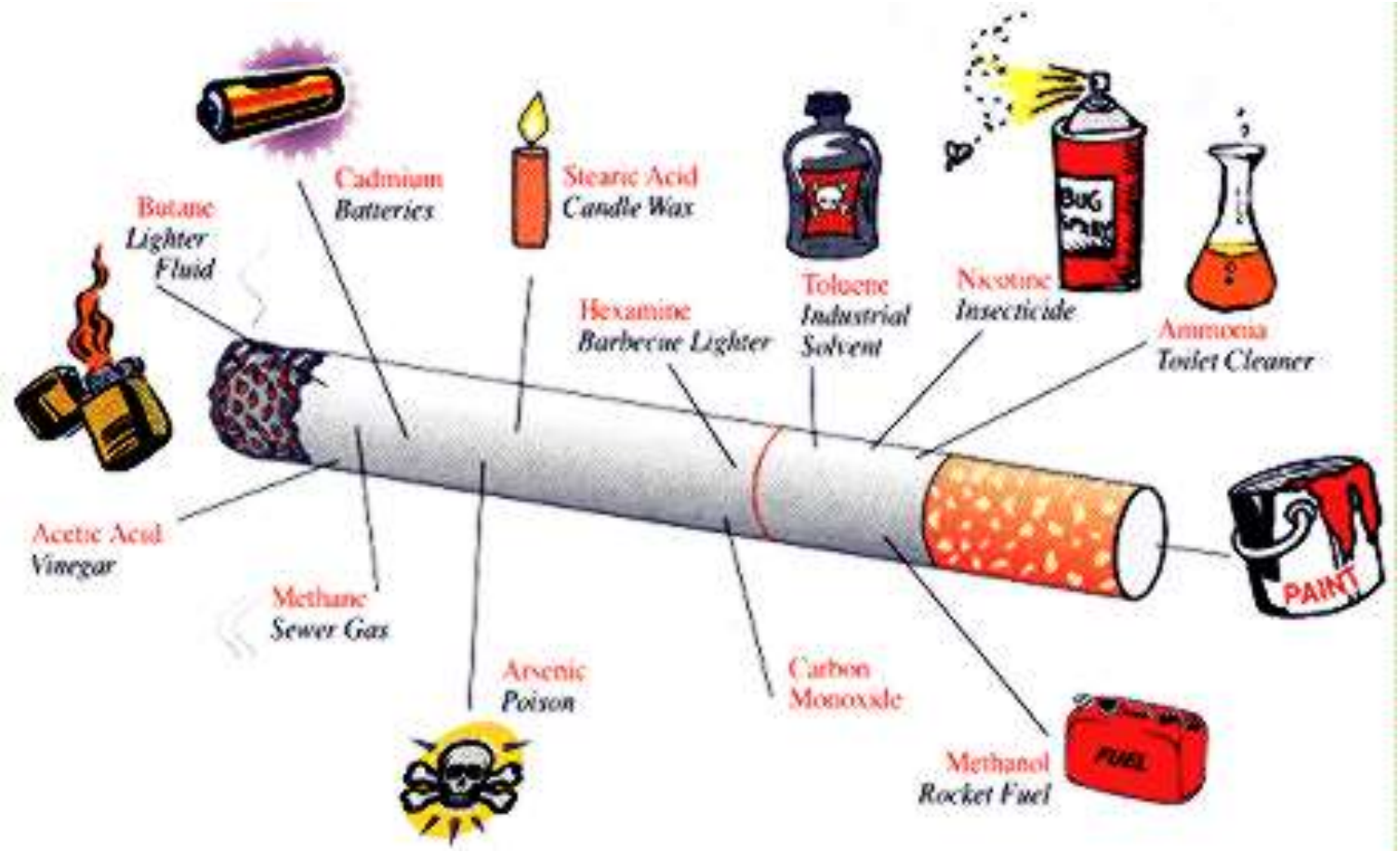
the nicotine gum (available in the West as Nicorette 2 mg and 4 mg strengths).

- **Nicotine transdermal patch: The disadvantages of nicotine gum (frequent administrations,**

unsightly chewing, bad taste, nausea, and dyspepsia) are mostly avoided by transdermal

nicotine, which is available as nicotine-releasing adhesive patches of varying sizes and

Thank You


Butane
Lighter Fluid
Cadmium
Batteries
Stearic Acid
Candle Wax
Hexamine
Barbecue Lighter
Toluene
Industrial Solvent
Nicotine
Insecticide
Ammonia
Toilet Cleaner
Acetic Acid
Vinegar
Methane
Sewer Gas
Arsenic
Poison
Carbon
Monoxide
Methanol
Rocket Fuel
BUG
PAINT
FUEL