

Poisons/drugs acting on cns

# Poisons /drugs acting on CNS

- **Classification**
- Inebriant poisons
  - Ethyl alcohol
  - Methyl alcohol
  - Isopropyl alcohol
  - Ethylene alcohol
- Somniferous poisons
  - Opium
  - morphine, Heroine
- Sedative and hypnotics
  - Barbiturates
  - Choral hydrate
- Deliriant poisons
  - Dhatura
  - Cannabis
- Spinal poisons
  - Strychnos nux vomica

- Antidepressant

- Amitriptyline
- imipramine

### Stimulant

- Cocaine
- Amphetamine

- Hallucinogens

- LSD

# Alcohols

- Hydroxy derivative of straight or branched chain aliphatic hydrocarbons
  - Ethanol
  - Methanol
  - Isopropanol
  - Dihydroxy alcohol(glycol-sweet)
  - Dihydroxyethane (anti freeze)

Longer the carbon chain ,greater the toxicity

# Alcohols

Psychoactive drug

- Solvents
- Antifreeze
- Antiseptics
- Antipyretics
- Solvent in drug solution
- Neurolysin
  - Destruction of nerves to stop pain in cancer

# Mechanism of action

- Effect on the CNS is directly proportional to its concentration in the blood
- Depress CNS in a descending order
- Depression of higher areas release their inhibitory control
- First region effected is **Reticular activating system**

# Mechanism of action

- Suppression of cerebral cortex cause behavioral changes
- Act directly on neuronal membrane
  - Involve ion transport and biogenic amines

- In lower concentration
  - more specialized and sensitive cells of the cerebral cortex
- with increasing concentration.
  - Lower levels of brain function are depressed

# metabolism

- Rapidly absorb from GIT
  - Concentration of alcohol
  - Presence and absence of food
  - Condition of stomach wall
  - Rate of drinking
  - Weight of person
  - Quantity of alcohol ingested
  - Development of tolerance
  - Reaches maximum in 45-90 minutes
  - Useful in predicting and managing consequences of its ingestion

# Elimination of alcohol

- Detoxified by liver
- 2-10% excreted unchanged

Stage	characteristics	Brain part	mnemonic
Stage 1 sobriety	0-50mg/dl		
Stage 2 Euphoria	50-100mg/dl	Frontal lobe	
Stage 3 excitement	100-150mg/dl Reaction time increased.incoordination,emotional instability	Parietal lobe	
Stage 4 confusion	150-200mg Confusion,vertigo,slurred speech,drunkun gait	Occipital lobe cerebellum	
Stage5 stupor	200-300mg/dl Diminished response,unconsciousness	Diencephalon	
Stage 6 coma	300-500mg/dl Deep unconsciousness,reflexes abolished	Medulla	

# Stages of toxicity

- STAGE OF EXCITEMENT
- STAGE OF INCOORDINATION
- STAGE OF NARCOSIS

## Stage of narcosis (over 300mg%)

- MacEwan's sign
- Hangover (temporary hase of indisposition)
  - Mild withdrawal syndrome

Drunk

head injury

- Typical presentation

- Incoordination and confusion
- Inappropriately aggressive or sensitive behavior
- Rapid fluctuation of neurologic abnormalities
  - Ataxia/ nystagmus
- Reliable history
- Physical examination
  - Less specific
  - Less sensitive

# Whom to suspect for alcohol intoxication

- Patients presenting with
- Coma
- Syncope
- Any inappropriate behavior
- Any neurological abnormality
- Trauma
- Traffic accidents
- Hypothermia

Fatal dose and fatal period

# Management

- Assess vital functions
  - Airway
  - Breathing
  - circulation
- Assess level of consciousness
  - Avoid stimulant and benzodiazepine
- Nutritional deficiencies
  - Mg,thiamine,pyridoxine
  - Monitor blood glucose level
    - Isotonic saline with 5%glucose
  - Hemodialysis
    - If level is 450mg/dl or decrease in hepatic function

- Assess and treat for complications
  - Hypoglycemia
  - Hypothermia
  - Occult head injury
  - Hyponatremia

# Laboratory investigation

- Breath
  - Road side breath test
  - Calibrated Breathalyzer
  - 1ml of blood =2100ml of alveolar air
- Blood
  - Gas chromatography
  - Alcohol dehydrogenase method
- Urine
- Vitreous fluid
  - Only taken during postmortem examination
- CSF

Postmortem appearance

# Medico legal aspects of alcohol

- Offence
- Prohibition(Enforcement of Hadd) order1979
  - Import,export,transport,manufactures ,sale or serve

## Accidents

driver

Pedestrians

## Crime

act of omission and act of commission

Violence

Homicide

suicide

# Alcohol intoxication and driving

- Statutory limit for charge of driving
- USA 0.08%-0.10%
- Canada and Britain 0.08%
- Scandinavian countries 0.05%
- East European countries 0.03%
  
- 0.03-0.05% affects driving ability

- An examination of accused can be carried out by a medical officer at the request of police even without his consent and by use of force if necessary

# Chronic alcoholism

- Habitual use of alcohol in excessive amount

# Chronic poisoning

- Delirium tremens
- Wernicke-Korsakoff's syndrome
- Acute hallucinosis

# Delirium tremens

- Stage of excitement with hallucinosis lasts for 3-4 days

## Characteristics

- Acute insanity
- Marked tremors
- Excitement /fear
- Hallucinations
- **Tendency to homicide**

# Korsakoff's psychosis

- Wernicke korsakoff Syndrome
  - Short lived Wernicke encephalopathy
  - Long term korsakoff psychosis
- Last 1month to one year
  - Hallucinations
  - Disorientations
  - Multiple neuritis
  - Memory for recent event lost(retrograde amnesia)
  - Gap fills by confabulations

# Acute hallucinosis

- Auditory hallucinations
- Lasts weeks to months
- Psychiatric emergency
- **Suicidal and homicidal intentions**

# Postmortem appearance

- Sign of neglect and malnutrition
- May be obese or edematous due to chronic heart failure
- Liver damage
  - Fatty change and enlargement with increase in weight upto2000g
  - Surface will be pale and greasy
  - Patchy yellow area
  - If abuse continues
    - Fatty change may give way to fibrosis
    - Cirrhosis of liver with nodules of 5-10 cm
    - **In late stages**
    - Liver become smaller and contract to hard, grayish –yellow block of 800-1200g

- **Heart**

- Enlarged
- patchy fibrosis with mixed cellular infiltrate
- hypertrophy of muscle fibers
- Patchy necrosis
- Hyalinization
- Nuclear enlargement
- Edema and vacuolization

- **Spleen**

- Enlarged and firm ,portal varices at gastro esophageal junction
- Systemic fat embolism
- Micro infarcts in brain and myocardium

Methyl alcohol

# Introduction

- Methanol (wood alcohol)
- Widely used in industry/home
- general solvent, thinner, antifreeze
- Massive outbreak
  - Ethanol shortages, prohibition
  - Accidental ingestion
  - Lethal dose
    - 30-240ml

# Mode of action

- Absorb from GIT
- Peak level 30-90 min
- Distributed throughout the body
  
- **Elimination**

# Clinical feature

- Metabolic acidosis
- Visual disturbances
- Permanent blindness
  - Muscular weakness
  - Liver/kidney
  - Intestinal contraction is diagnostic of methanol poisoning

# Treatment

- Gastric lavage
- Bicarbonate
- Whole bowel irrigation
- **Antidote**
  - Ethanol
  - 4-methylpyrazole
  - Folinic acid

# Postmortem appearance

- Cerebral and pulmonary edema
- Liver necrobiosis
- Kidney tubular degeneration

# Medico legal aspects

- Accidental poisoning may occur due to consumption of liquor containing methyl alcohol by drinkers of cheap illicit liquor