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Ethanol poisoning

Alcohol Abuse

ABUSERS

- Usually have self-restraint when necessary
- Usually don't have a very high tolerance
- Can function normally without drinking
- Won't suffer from withdrawal symptoms when they stop drinking

→ not physically or physiologically dependent on alcohol

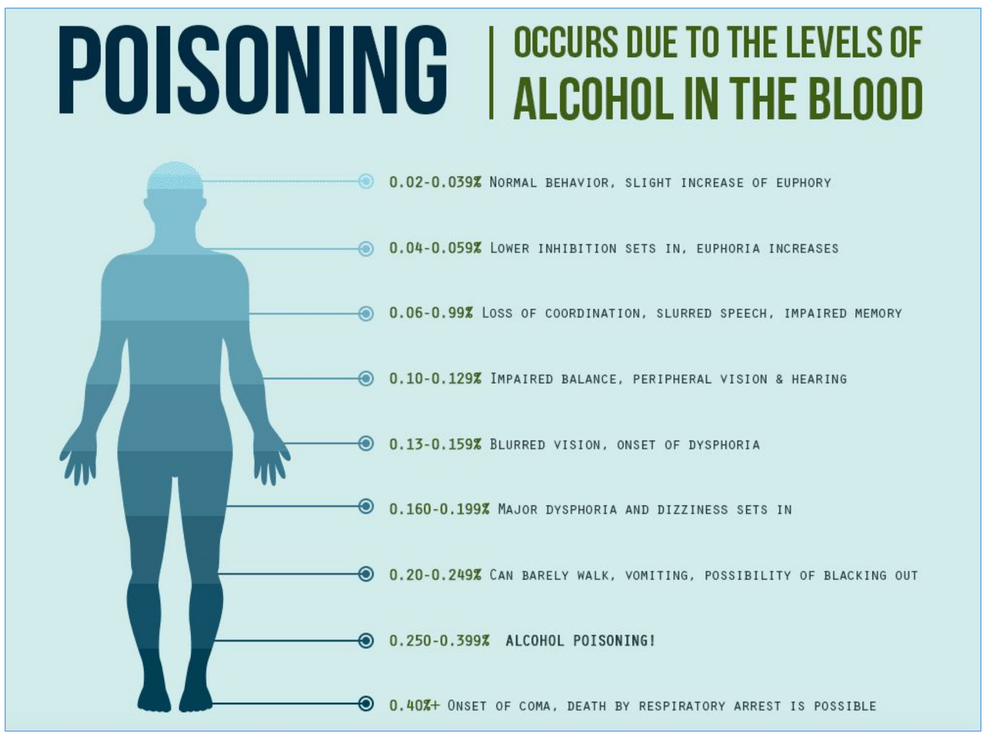
VS

Alcoholism

ADDICTS

- Have very little control over how much or how often they drink
- Build up a tolerance to alcohol
- Experience withdrawal symptoms when trying to be sober
- Continue drinking to avoid the symptoms of withdrawal

→ completely physically and physiologically dependent on alcohol



Alcohol abuse

Binge drinking

- Generally defined as: having 4 drinks in a 2-hour period for women, and 5 drinks in a 2-hour period for men → blood alcohol concentration to 0.08 g/dl or above
- Most common, costly, and deadly pattern of excessive alcohol use in the US
- Health problems:
  - Alcohol poisoning
  - Unintentional injuries → car crashes, falls, burns
  - Violence including homicide, suicide, intimate partner violence & sexual assault
  - Unintended pregnancy, poor pregnancy outcomes (miscarriage & stillbirth)
  - Fetal alcohol spectrum disorders
  - Chronic disease → high blood pressure, stroke, heart disease & liver disease
  - Cancer of breast, mouth, throat, esophagus, liver & colon
  - Alcohol use disorders

Acute ethanol intoxication

- Acetate enters citric acid cycle → oxidized to carbon dioxide + water
- Oxidation of ethanol uses quantities of NAD (nicotinamide adenine dinucleotide)
  - Depletion of NAD causes citric acid metabolites + lactate to accumulate
  - Liver cirrhosis, impaired glycogenesis → hypoglycemia
- Capacity of alcohol dehydrogenase to metabolize ethanol is limited, because the enzyme is saturated at low ethanol concentration → zero-order kinetics
- Ethanol at higher or chronic doses → undergoes oxidation by P450 enzymes → CYP2E1
  - CYP2E1 is induced by long-term alcohol use → alcohol tolerance in heavy drinkers
- 2% of ethanol is excreted unchanged by kidneys and lung
  - Concentration of Ethanol in alveolar air is ~0.05% of that in blood
- Adult weighing 70kg metabolizes only about 10ml of ethanol per hour

Central nervous system

- Effects the action of γ-aminobutyric acid (GABA) → thereby produces sedative-hypnotic, anxiolytic, amnesic & anticonvulsant effects
- Low doses of ethanol produces disinhibition and mild euphoria
- Inhibits the release of acetylcholine from CNS neutrons → may contribute to the sedation and delirium
- Inhibits the release of vasopressin (antidiuretic hormone) from pituitary gland → produces a diuretic effect
- Produces vasodilation and increases heat loss from body → can contribute to hypothermia during cold weather

Other Effects

- Short-term and long-term cardiovascular and autonomic effects
- Peripheral vasodilation, depression of regulatory centers in medulla & release of norepinephrine from sympathetic neutrons → blood pressure fluctuations
- Thiamine deficiency prior to a poor diet
  - Nerve demyelination → peripheral neuropathies
  - Wernicke-Korsakoff syndrome: behavioural disorder characterized by confusion, severe anterograde and retrograde amnesia, ataxia, nystagmus & ophthalmoplegia

Alcoholism

The National Council on alcohol drug dependency define alcoholism as:

"a primary, chronic disease characterised by impaired control over drinking, preoccupation with drug alcohol, use of alcohol despite adverse consequences, and distortions in thinking."

Causes of alcohol addiction

- Biological factors → genetics & physiology
- Psychological factors → stress, anxiety, depression etc.
- Environmental factors
- Social factors → culture, family, religion, work influence

Signs of Alcoholism

- Not being able to control when you drink
- Not being able to control how much you drink
- Having uncontrollable cravings that drive you to consume alcohol
- Developing a tolerance to alcohol
- Turning to alcohol during times of stress, anger or sadness
- Keeping alcohol hidden in various locations
- Becoming irritable when you are not able to drink when you want to
- Continually drinking, even though doing so is producing a negative effects in life

Pharmacotherapy

Drugs used in acute ethanol withdrawal:

- Benzodiazepines
  - Long-acting drug: chlordiazepoxide, diazepam
    - Require less frequent dosing
    - Pharmacologically active metabolites are eliminated slow →provide a bulit-in tapering effect
    - Active metabolites may accumulate
  - Short-acting drug: lorazepam, oxazepam
    - Rapidly converted to inactive water-soluble metabolites → will not accumulate
    - Useful in alcoholic patients with liver disease
- Thiamine: for Wernicke encephalopathy prophylaxis or treatment

Naltrexone

- Non-selective competitive antagonist of opioid receptors
- Reduces risk of relapse in individuals with alcoholism
- Taken alone and in combination with behavioural counselling
- Administration:
  - Once a day, oral dose of 50mg
  - Extended-release formulation: once every 4 weeks, intramuscular injection
- Adverse Effects:
  - Hepatotoxicity → combination of naltrexone + disulfiram should be avoided (both hepatotoxins)
  - will precipitate a withdrawal reaction in individuals physically dependent on opioids and will prevent the analgesic effect of opioids

Acamprosate

- NMDA receptor antagonist and GABAA agonist effects
- Reduced risk of relapse in individuals with alcoholism
- Administration: 3x a day, oral dose of 333mg
- Adverse Effects
  - Gastrointestinal (nausea, vomiting, diarrhea)
  - Rash

Disulfiram

- Inhibits aldehyde dehydrogenase → resulting in aldehyde accumulation during ethanol ingestion
- Deterrent to drinking in individuals with alcohol dependence; rarely used
- Adverse Effects
  - Little effect alone
  - Severe and potentially dangerous flushing, headache, nausea, vomiting, and hypotension when combined with ethanol

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