

ETHANOL TOXICITY



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INTRODUCTION

- **What are alcohols?**

An organic compound in which the hydroxyl functional group (-O H) is bound to a carbon atom.

- **Give examples?**

- Ethyl alcohol (C₂H₅OH).
- Methyl alcohol (CH₃OH).
- Isopropyl alcohol (C₃H₇OH).
- Ethylene glycols (C₂H₄
- (OH)₂

- **THE MAIN ACTION:**

CNS sedation is the main effect of all alcohols.

- **TYPES:**

- **Drinking**

- - Ethyl Alcohol

- **Poisonous**

- - Methyl Alcohol
- - Isopropyl Alcohol
- - Ethylene glycol



ETHYL ALCOHOL (ETHANOL)

✓ the most commonly used and abused drug in the world.

✓ At alcohol shortage, the alcoholic may ingest an alternative (methanol) with much more toxic effect.

✓ produced by fermenting carbohydrates, such as sugars or starches; So it may be produced **postmortem**.

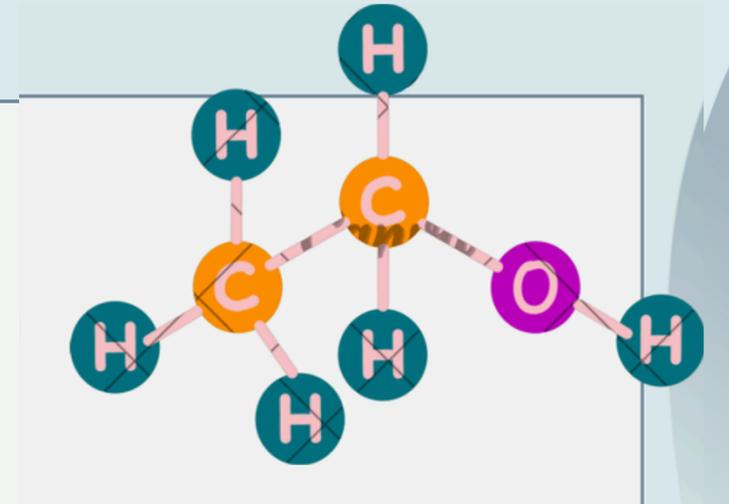
كيفية بدي تعرف هل هذا ال ethanol هو شرابه
ولا هو متكون في الجسم !!

→ through metabolites → لانه ال metabolites من

روح متكون في جسم الميت
هنا بكون ethanol
هو شرابه قبل



ETHYL ALCOHOL (ETHANOL)



✓ Chemistry: Colorless, odorless; highly water soluble and highly lipid soluble.

this is important for kinetics → rapid absorption and distribution through the body

✓ Ethanol toxicity may be acute or more commonly chronic.

✓ usually taken with other drugs that may increase the toxicity e.g.: barbiturates.

this is called coinjection

SOURCES:

ALCOHOLIC	MANUFACTURING	CONCENTRATION OF ALCOHOL
Beer	Fermentation of Barley لے الشعير	2-5%
Wine	Fermentation of fruits	10-15%
Whisky, vodka and Brandy	Fermentation then instillation لے تقطير	>30%

KINETICS:

↪ *mainly in intestine*

» **Absorption:** 20% from stomach; 80% from intestine.

-80–90% of an ingested dose is fully absorbed within 60 minutes.

» **Distribution:**

- The distribution of alcohol is into total body water.
- It is distributed to all body tissues

METABOLISM + EXCRETION

90%

Liver.

10%

unchanged in urine, breath,
sweat

Toxicokinetics

» Metabolism

Metabolism of alcohol occurs primarily in the liver by the alcoholic dehydrogenase enzyme which also occurs at the wall of stomach

» Elimination

alcohol is excreted unchanged in urine, sweat and breath.



ACTION:

✓ No specific receptor for ethanol.

Theories:

✓ **Membrane Theory**: as a solvent ^{عذيب} it fluidize the neuronal plasma membrane lipid bilayer.

✓ **Protein Theory**: through specific binding sites on the protein.

EXAMPLES OF THESE PROTEINS:

- o Increases GABA A receptor
- o increase glycine activity.
- o inhibits L-type Ca channels reducing CNS excitability
- o Inhibits glutamate activity (excitatory neurotransmitter).

FATAL DOSE

- It varies markedly, but Levels of blood alcohol above 500mg% are

اعتبارها أن تكون سبباً في بقاء dose يختلف
عن جسم تدخر:

considered to be probably fatal.

- **Tolerance**

- **Stomach state**

The higher content of alcohol dehydrogenase (ADH) in the male gastric mucosa.

- **sex** *له وهذا بزيه من قدرة اد male على الشرب أكثر من females*

in Japanese or Chinese, there is increased incidence of flushing, vasodilatation, tachycardia (acetaldehyde syndrome)

- **race** *↳ because there body lack acetyl aldehyde dehydrogenase enzyme (genetic deficiency)*
مش كلهم بس نسبة كويسة عنهم

Liver disease

10 - 20% are absorbed rapidly than low or high alcohol.

Concentration of alcohol beverage *مشروب*

ACUTE ALCOHOL INTOXICATION

result from a high level of alcohol in the bloodstream leading to drunkenness (السكر)

Causes:

The condition is found in

- 1- Young people who are being exposed to commonly available alcoholic beverages like beer, wine, and distilled liquor for the first time, and don't know their limits.
- 2- People suffering from alcoholism who ingest much more than they usually do.

legal blood alcohol concentration

measured in

percentage

mg/dl

Legal BAC limits by country

نم و عتبه بسبب ارتفاع
نسبة حوادث السير

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		Legal blood alcohol concentration (BAC) limits ⁱ		
Country	Year	General population	Young/novice drivers	Professional/commercial drivers
Israel	2016	0.05%	0.01%	0.01%
Italy	2016	0.05%	zero tolerance	zero tolerance
Jamaica	2016	0.08%	0.08%	0.08%
Japan	2016	0.03%	0.03%	0.03%
Jordan	2016	0.08%	0.08%	0.08%

1. Sobriety or low-level intoxication (0.01-0.05%)

the person's behavior will be normal with **no visible signs of intoxication**, such as slurred speech or delayed reaction time

لم في هاي

المرحلة إذا

الشد من قتل

خط ابدو على

استي حزن

بشيء على

السريع

هذه هي المرحلة التي يشربوا بهم
↑ يومها

2. Euphoria (0.05-0.12%)

في هذه

المرحلة لك

الشخصية

أبده على أي

حسني بطول

لحدها يشيلها

Some symptoms include

an increase in chattiness and confidence

a delayed reaction time

decreased inhibitions

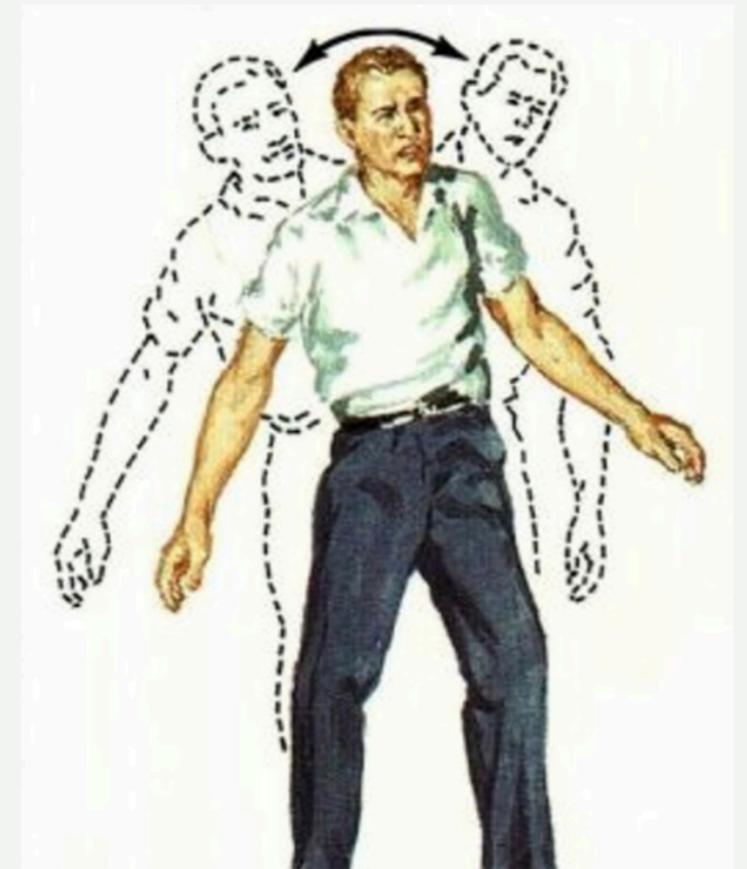
→ this stage will affect the cerebellum → leading to complication in movement

3. Excitement (0.12-0.25%)

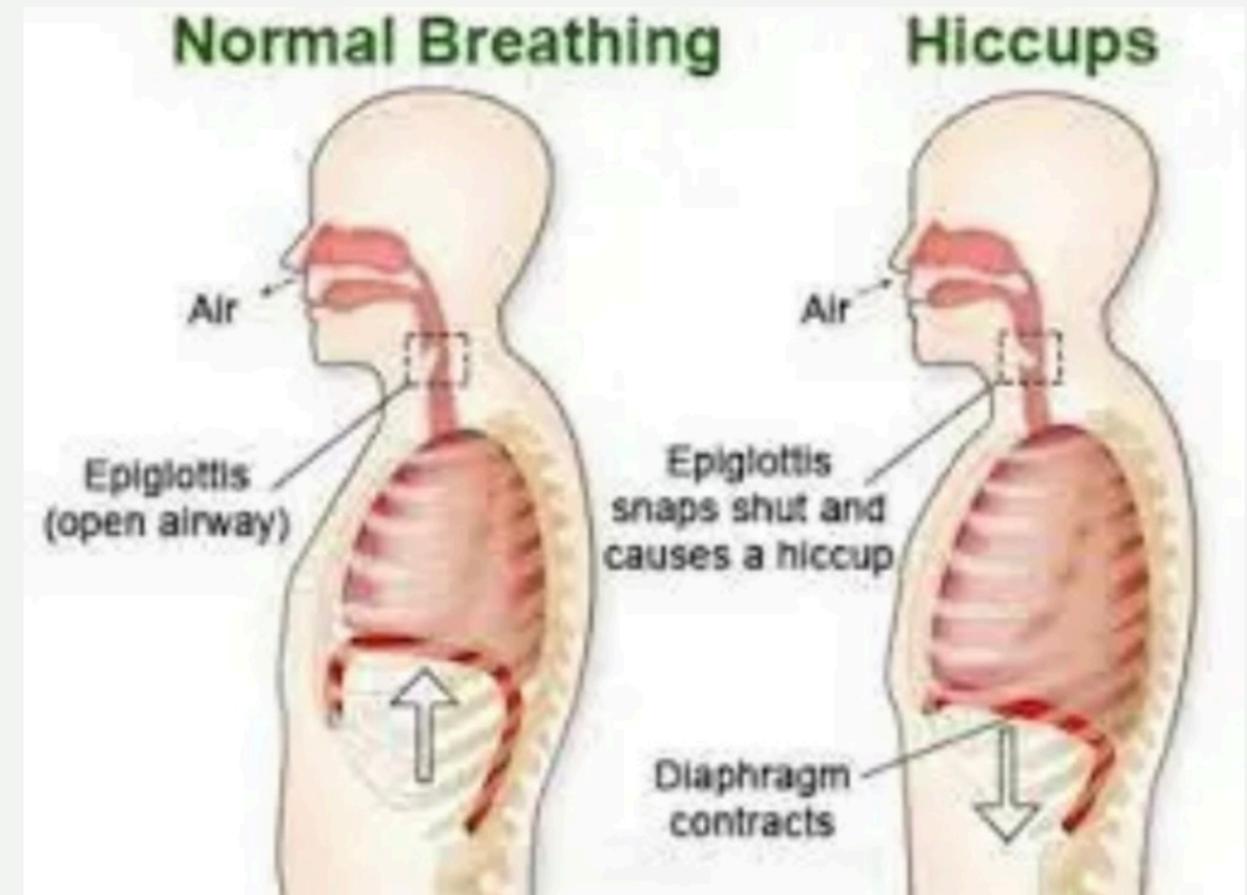
At this time, a person will begin to experience emotional instability and a significant loss of coordination .

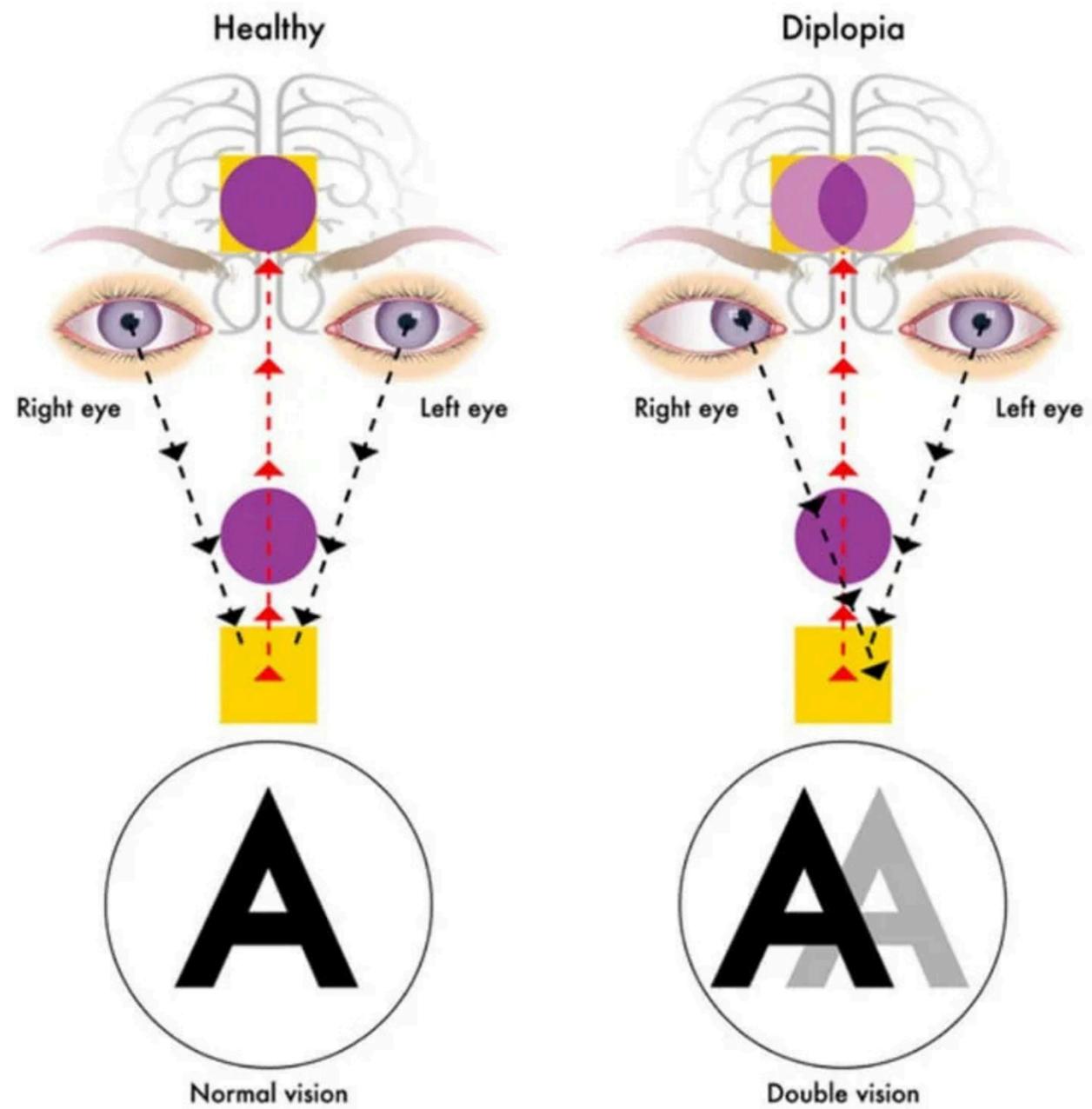
Other symptoms include :

- Loss of muscle coordination
- Ataxia
- Slurred speech
- No behavior control



- Hiccough
- Diplopia
- Vomiting and drowsiness
- Altered sensations and perceptions
- McEwen's sign (constricted pupil when the lower eyelid is pinched it dilates)





Diplopia

4. Confusion (0.25-0.3 %)

This stage of intoxication is marked by emotional outbursts and a major loss of coordination. The person may not be able to stand up, may stagger when walking, and will likely be extremely confused about what's going on



تعتبر أول مراحل Coma

5. Stupor (0.3–0.4%)

- no responds to the things happening around or to them
 - A person won't be able to stand or walk. They may completely pass out or lose control over their bodily functions, becoming incontinent or vomiting uncontrollably.
 - They may also experience seizures or have blue-tinged or pale skin. Their breathing and gag reflexes will likely be impaired.



Coma & death > 0.4%I



INVESTIGATIONS

1. Expired air ethanol analyzer: :

- Also called as **alcometer**, **intoximeter** or **drunkometer** or **breath analyzer**.
- Breath analyzer serve as **on-spot test** for police.
- **Alcohol** is eliminated via breath.
- Main idea is ethanol is **oxidized by oxidizing agent with change of color**



INVESTIGATIONS:

- Blood alcohol level
- ABG and blood pH
- Blood glucose level
- Liver function test
- ECG



TREATMENT:

General

specific

Supportive



No antidote



Is the main line

1- GENERAL

→ decrease absorption or increase elimination

- general speaking that **gastrointestinal decontamination is rarely, if ever, indicated for toxic alcohols because of their rapid absorption and limited binding to activated charcoal.**

1- Emesis: It is rarely indicated in the acutely intoxicated adult, especially in the setting of depressed mental and/or consciousness state. → because it may cause Aspiration pneumonia

2- Gastric lavage: • Not effective due to **rapid absorption.**

- Indicated in concomitant ingestion of toxic agents.

- Done by Na bicarbonate or tape water.

3- Activated charcoal: It is not effective as alcohol is **poorly adsorbed** by it. It is indicated only in concomitant ingestion of other toxic agent.

4- Haemodialysis: It is indicated in:

- Extremely high alcohol level.

- Severe acid base and/or electrolyte disturbance

SUPPORTIVE AND SYMPTOMATIC TREATMENT

- **Respiratory care**
 - Patent air way, O₂, mechanical ventilation.
- **Shock**
 - By fluid IV.
- **Altered mental status**
 - Correct hypoglycemia by dextrose 50%. * Naloxone: 1-2mg IV
- **Metabolic disorders : alcoholic ketoacidosis**
 - Fluids, glucose, Ca and other trace elements
- **Other measures**
 - Thiamine, folic acid (prevent encephalopathy and improve mental status) & warmth

AT HOME:

- If they're **unconscious**, gently turn the person on their side to prevent them from choking on vomit.
- If they're **conscious**, encourage the person to lay on their side in a safe place until help arrives.
- If they're **able to swallow**, encourage the person to drink **water**.

It's a myth ^{خرافة} that a person can recover from alcohol intoxication by sleeping, taking a cold shower, going for a walk, or drinking black coffee or caffeine.

In fact, doing these things can put an intoxicated person at greater risk of injury and death

If this person assaulted rape of 14 years old female, could be excuted or not



من epiphyseal plate
إذا كان فعلت أو line موجودة يكون أقل
من ١٨ سنة
إذا كان مخفي وإذا الشخص أكبر من ١٨ سنة
وكتب عليه بالإعدام .

CHRONIC ALCOHOLISM

يعني هذا الشخص يكون مدمن على هذه المادة

Definition:

Alcohol dependence or continued consumption of alcohol in spite the negative consequences produce on an individual's health and social relationship.

لم يعني حتى لو أخذ الكحول، 2. يَأْتُرْ عَلَيْهِ طَبِيعٌ
فهو لها مآكل وياخذها

Alcohol dependence is characterized by:

أكثر استي تأثيره يكون على:

1) liver

2) CNS

-Tolerance →

بكون جسمه خالص تعود على
alcohol فبغير لازم يرفع من
القيمة إلى بشرتها حتى
رانه يثأثر

-Physical dependence

-Withdrawal symptoms

CLINICAL PICTURE:

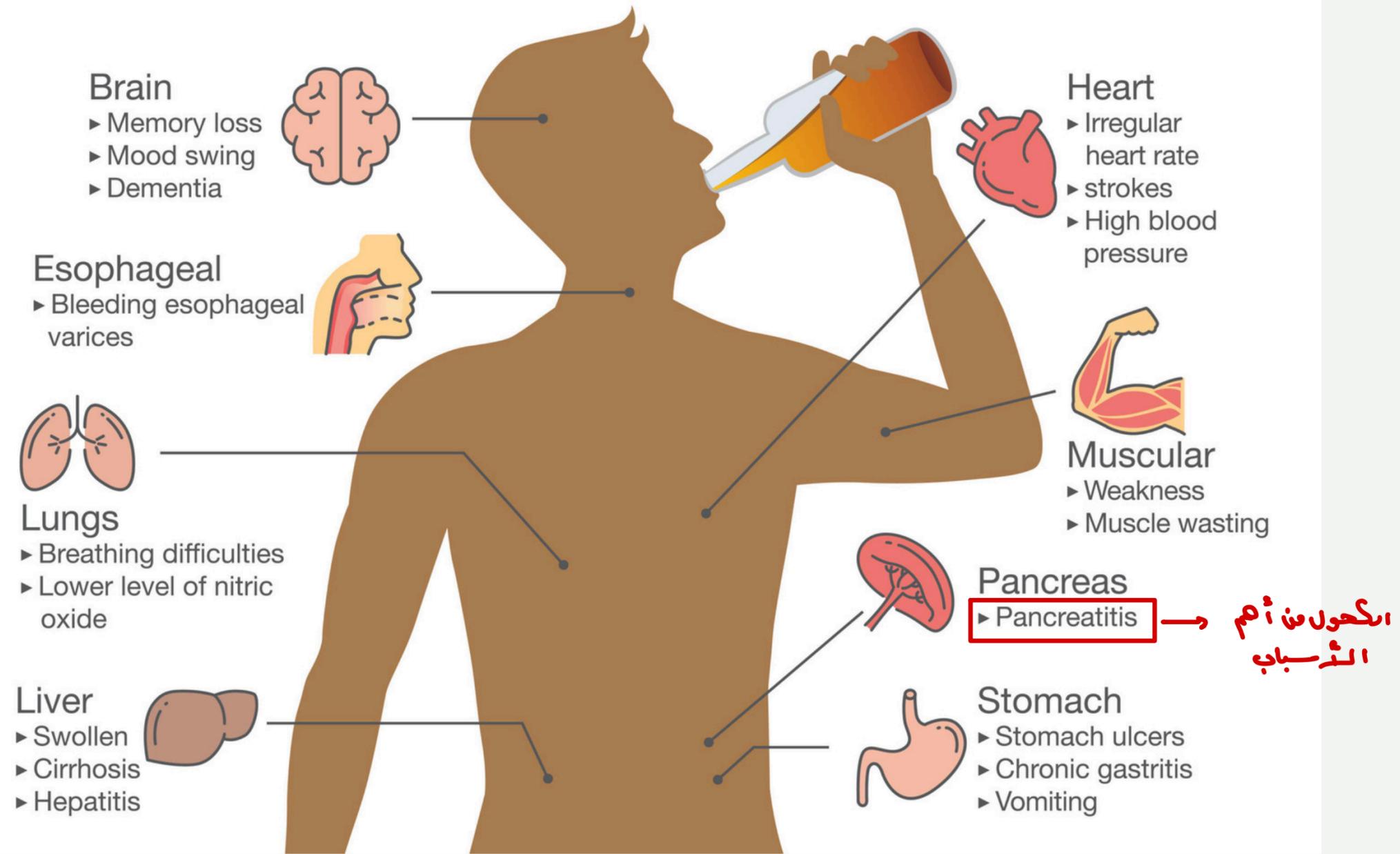
General appearance:

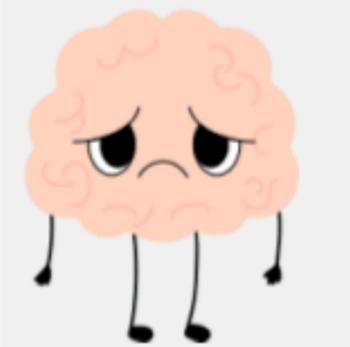
- 1- Hand Tremor.
- 2- Excitability, Irritability, Nervousness.
- 3- Dermatitis (dry, red, itchy skin).
- 4- Parotid Swelling.
- 5- Finger Clubbing.
- 6- Rhinophyma ("Drinker's Nose").

Red swollen and bumpy nose accompanied by rhinorrhea. Recently alcoholism does not cause rhinophyma but may worsen it



Symptoms and Effects of Alcoholism





CNS

Peripheral:

- 1- peripheral neuritis (S more than M).
Sensory ↑
- 2- course tremors of hands.
motor ↑

Central :

- 1- Pachymeningitis hemorrhagica (chronic subdural hematoma). →

لأنه حكيما هو بئر على الاتزان فمرة على مرة 1/2 تنزبه فمرة trauma وهذا

- 2- Wernicke-Korsakoff syndrome.

الاسم بزيه فنا
bleeding tendency.

- 3- Bilateral and symmetrical visual impairment.

↓
may lead to:

1) dementia

2) Parkinson

WERNICKE ENCEPHALOPATHY :

Triad of paralysis of external eye muscles, cerebellar ataxia, and mental confusion treated by thiamine.

KORSAKOFF ENCEPHALOPATHY :

As Wernicke plus ^{فقدان الذاكرة} amnesia not amenable to thiamine therapy.

LIVER:

- Is the most frequent clinical complication of chronic ethanol abuse.
 - Fatty liver, alcoholic hepatitis, cirrhosis, cancer



FETAL ALCOHOL SYNDROME:

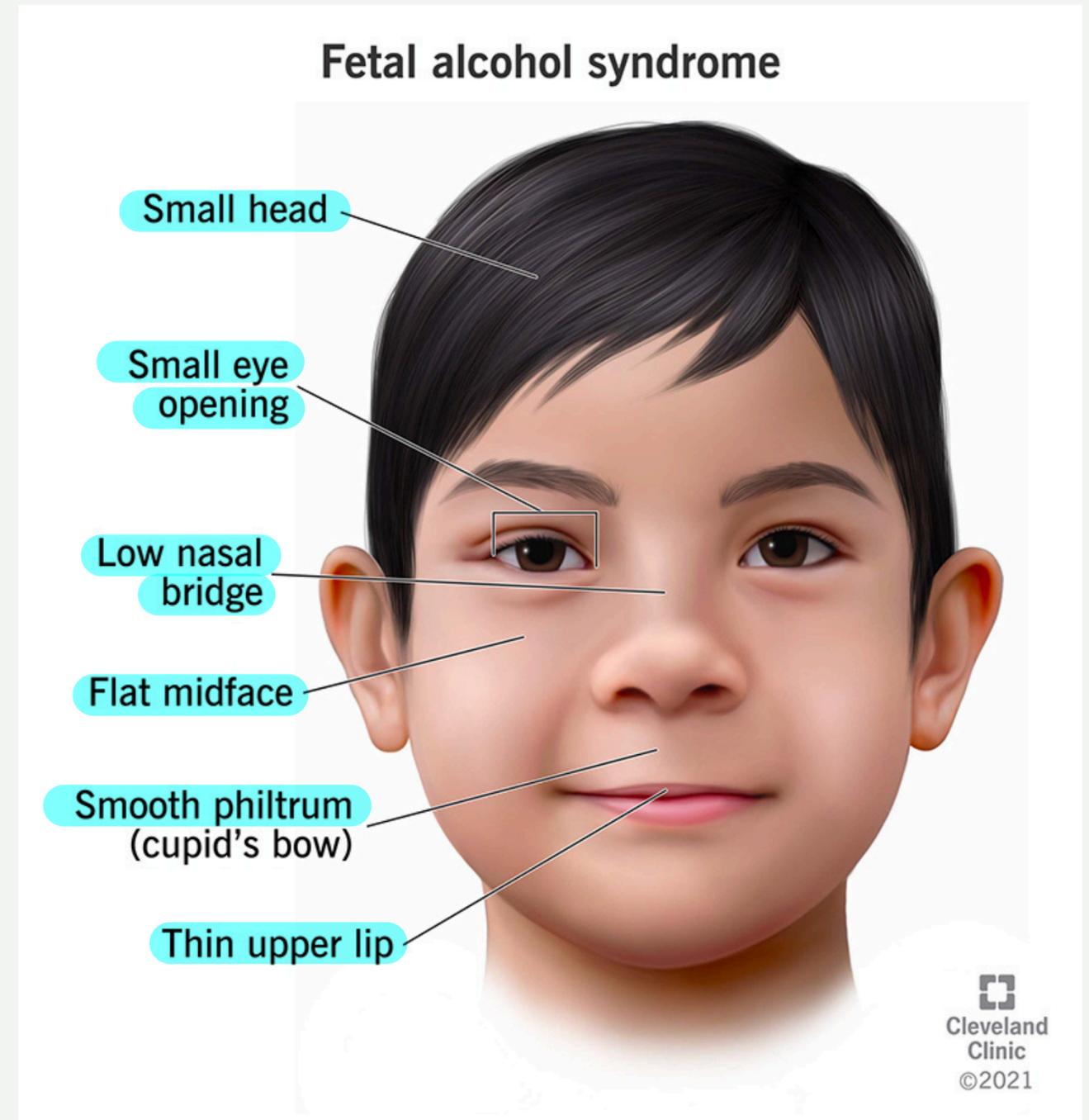
Fetal exposure to alcohol can impair the development of the corpus callosum (the main connection between the right and left hemispheres of the brain), reduce the size of the basal ganglia and damage the cerebellum and cerebral cortex.

- **Compared to normal babies, babies born with FAS have:**
 - smaller heads and brains
 - some degree of mental retardation
 - poor coordination
 - hyperactivity
 - abnormal facial features

FETAL ALCOHOL SYNDROME:

The syndrome is due to:

- Hypoglycemia
- Acetaldehyde
- Ethanol itself



ACUTE ALCOHOL WITHDRAWAL

Definition:

Alcohol withdrawal refers to symptoms that may occur when a person who has been drinking too much alcohol every day suddenly stops drinking.

The withdrawal usually occurs within 5 - 10 hours after the last drink, but it may occur up to 7 - 10 days later

ACUTE ALCOHOL WITHDRAWAL

* الأعراض تختلف من شخص لآخر وذلك باختلاف:
١) الكمية التي كان يشربها
٢) من أي عمر بلّغ يشرب

Clinical picture:

Mild-to-moderate psychological symptoms:

1. nervousness.
2. Anxiety.
3. Irritability or easy excitability.



ACUTE ALCOHOL WITHDRAWAL

Clinical picture:

- Mild-to-moderate physical symptoms:

- Headache (general, pulsating)

- Sweating (especially palms of the hands or the face)

- Nausea and vomiting. -Insomnia

- Rapid heart rate. -Dilated pupils

- Involuntary, abnormal movements of the eyelids

- Clammy skin. -Tremor of the hands

لے جلد دھبے، بارد مع عرق

ACUTE ALCOHOL WITHDRAWAL

Clinical picture:

- Severe symptoms

- Delirium tremens (a state of confusion and visual hallucinations)-
- Convulsions

Treatment:

- Hospitalization
- Sedatives (benzodiazepines)-
- No alcohol is allowed during this time-
- .Antipsychotic medications (uncommon)-
- Treatment for other medical problems
- Rehabilitation for alcoholism is recommended-

و بنسختها إلتد مع الحالات
delirium severe لما يكون عنده



ACUTE ALCOHOL WITHDRAWAL

Drugs used in acute withdrawal

.Patients should ideally be nursed in quiet surroundings.

Benzodiazepines

- Be careful of possible dependence to benzodiazepines

.advise short courses at lowest necessary dose

Vitamin B complex

Intravenous therapy with vitamin B complex is the treatment

.of Wernicke-Korsakoff syndrome.

Naltrexone

Psychosocial interventions

DISULFIRAM (ANTABUSE)

- Irreversibly and specifically blocks aldehyde dehydrogenase.
- This leads to a build up of acetaldehyde which results in an *unpleasant reaction, thereby the patient will be unkeen to take alcohol
- Side effects*
may include : Garlic taste , راس rotten egg odor, dermatitis
.psychosis

DISULFIRAM (ANTABUSE)

: treatment of disulfiram side effects:

-oxygen-

-ephedrine sulphate-

-ascorbic acid 500 mg IV-

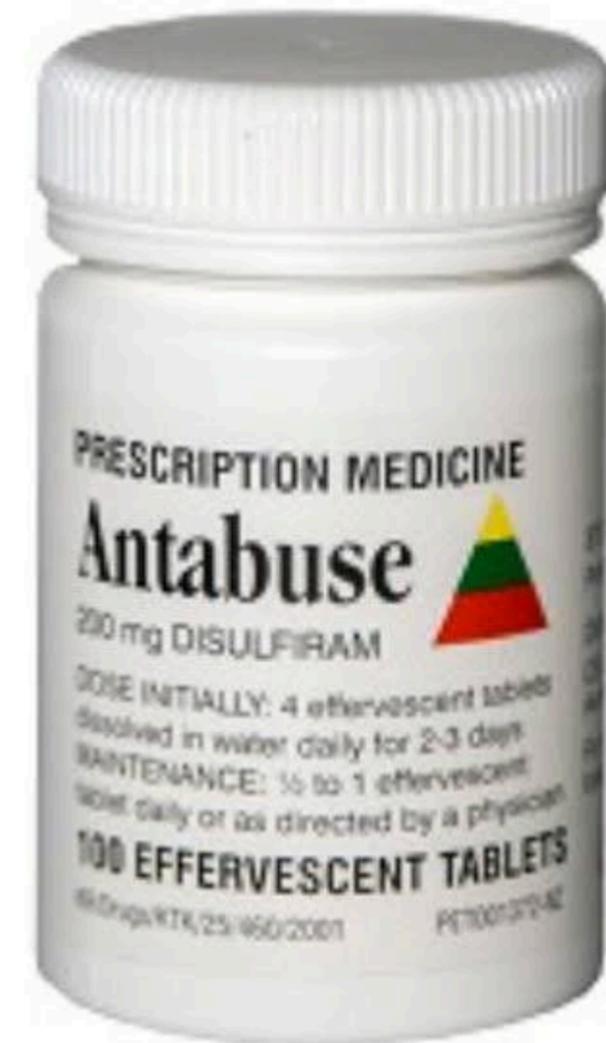
-antihistaminic-

-phenothiazines and fluids-

: Dose of Disulfiram :

-initial 500 mg once daily for 7-10 days.

-then 125 - 250 mg/day orally.



CIRCUMSTANCES OF POISONING OF ETHYL ALCOHOL:

Ingestion of alcoholic beverages:

Acute alcohol intoxication or alcohol poisoning occurs after the ingestion of a large amount of alcohol. But in unexperienced drinkers or those sensitive to alcohol may become acutely intoxicated and suffer serious consequences after ingesting smaller amounts of alcohol.



Industrial exposure

Accidental:

by children after drinking alcohol or taking chocolates containing liqueur



MEDICO-LEGAL ASPECT OF ALCOHOL POISONING:

Road traffic accident:



- Due to lack of coordination, concentration reduced visual perception & alertness to external clues.

Crimes:

- Alcohol can be associated with a wide variety of crimes ranging from minor offences which are anti social by nature, through traffic offences, minor assaults through to serious assaults and murder.

Trauma:

- Alcohol causes muscle in-coordination, and this leads to ataxia and unstable gait. Patient is unable to control his movements and is liable to fall out during his walk. This makes him most liable for head injuries and other traumas.

THANK YOU