

Alcohol abuse and dependence: diagnosis and treatment

Psychiatry lecture for medical students

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Burden of excessive alcohol use

- Risk factor for
 - Social problems,
 - Financial problems,
 - Legal problems,
 - Relationship problems,
 - **health problems**;
- Alcohol is responsible for
 - 3.2% of all deaths and
 - 4.0% of the global burden of all disease (DALYs).



(Illicit drugs are responsible for 0.4% of deaths and 0.8% of DALYs)

DSM-IV-TR Alcohol-related mental disorders

1. Alcohol use disorders:

- Alcohol **abuse**
- Alcohol **dependence**

2. Alcohol-induced disorders:

- Alcohol intoxication
- Alcohol **withdrawal** with or without **delirium**
- Alcohol-induced **amnesic disorder** (Korsakoff) / dementia
- Alcohol-induced psychotic disorder (e.g. delusion of jealousy and alcoholic hallucinations)
- Alcohol-induced mood, personality, anxiety, sexual, and sleep disorder

+ **At-risk alcohol use**

Basic definitions and diagnosis

Basic definitions: moderate (safe) drinking

- Men: max. 2 drinks/day;
- Women: max 1 drink/day;
- Persons >65 years of age: <1 drink/day

- 1 drink = 10g of pure alcohol = 1 glass of beer, 10cl of wine, 2cl of spirits

Basic definitions: at-risk drinking

- Men: >14 drinks/week OR >4 drinks per occasion;
- Women: >7 drinks/week OR >3 drinks per occasion
- Potentially can lead to serious physical harm and psychological or social disfunctions.

Basic definitions: alcohol abuse

- Maladaptive pattern of alcohol use:
 - Failure to fulfill role obligations at work, school or home
 - Physically hazardous situations
 - Legal problems
 - Continued use despite serious social and interpersonal problems

Basic definitions: alcohol dependence

- (Heavy and prolonged alcohol use);
- Tolerance (need for increase amounts; diminished effect of the same amount)
- Withdrawal (certain symptoms when stop alcohol use, alcohol cures the syndrome)
- Persistent desire or unsuccessful efforts to cut down alcohol use
- Great amount of time is spent on activity related to the substance
- Social, work or recreational activities are given up
- Continued use despite of knowledge of serious social, psychological, and physical problems

The **CAGE** screening instrument for alcohol-related problems

Two "yes" responses warrant further assessment:

1. Have you ever felt you needed to **C**ut down on your drinking?
2. Have people **A**nnoyed you by criticizing your drinking?
3. Have you ever felt **G**uilty about drinking?
4. Have you ever felt you needed a drink first thing in the morning (**E**ye-opener) to steady your nerves or to get rid of a hangover?

(Sensitivity: 85%, specificity: 89%)

Laboratory tests

- Might be helpful to confirm the diagnosis of alcohol misuse:
 - **MCV** (mean corpuscular volume) elevation
 - High levels of **GGT** (gamma-glutamyl transpeptidase)
 - High levels of liver transaminases (**AST, ALT**)
 - AST is two times higher than ALT
 - High levels of uric acid, triglycerids

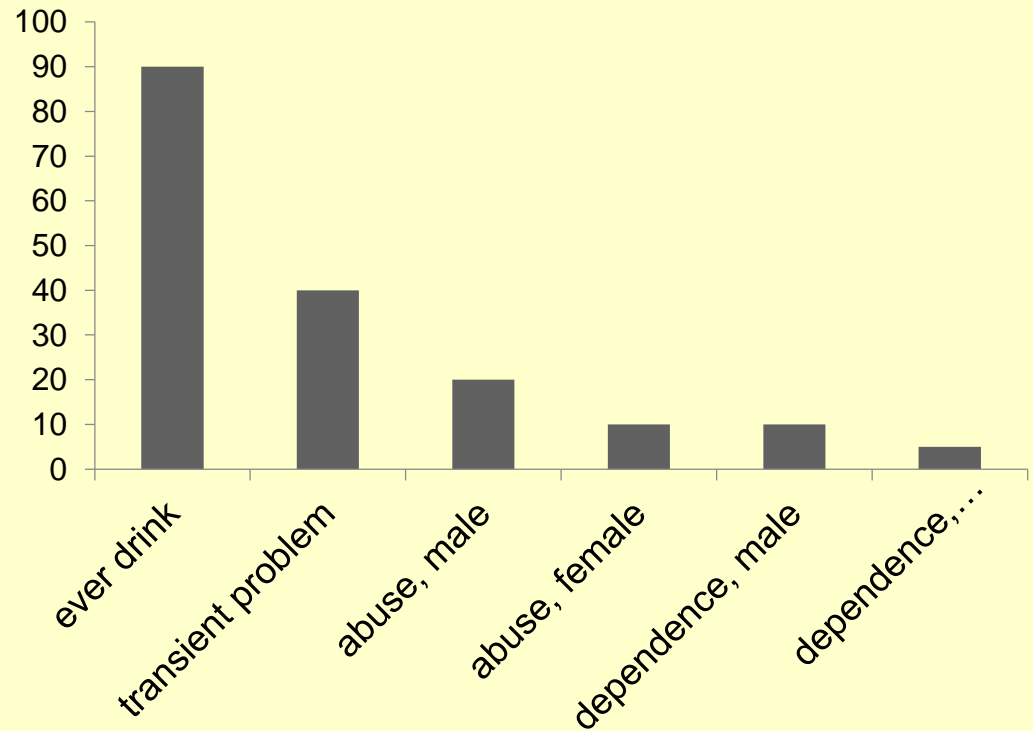
Epidemiology

Alcohol consumption in the World



Epidemiology

- Transient problems: **40% of US population**, more common in whites
- Abuse:
 - male: 20%,
 - female: 10%
- Dependence:
 - male: 10%
 - female: 3-5%



Chronic, recurrent condition with frequent ups and downs
25% good prognosis, 25% poor prognosis, 50% fluctuating

Etiology

Etiology I. Psychological and social factors

- „**Folk psychology**”: alcohol as a short-term psychological painkiller;
- **Psychodynamic theories**: manifestation of oral regression, self-punitive harsh superego, inability to deal with reality;
- Increased **stress-reactivity** (anxious and moody)
- Impulsivity, tendency to violence – **antisocial and narcissistic traits**
- Decreased sensitivity to natural **rewards**, novelty seeking, and increased reinforcement after alcohol intake
- **Sociocultural** factors (30-40%?)
- **Family** history: interaction between childhood adverse effects and genetics (60%?)
- **Co-morbid mood- and anxiety disorders (30-40%)**

Etiology II. Genetics

- Close family members of an alcoholic person have a fourfold risk;
- Twin studies: higher concordance rate in identical twins than in fraternal twins;
- Adopted-away children of alcoholic persons have a fourfold higher risk.
- A1 allele of the dopamine **D2** receptor, NR2A subunit of the **NMDA** glutamate receptor, alcohol dehydrogenase and **acetaldehyde dehydrogenase** (converting to acetic acid) in Asian people and multiple others

Etiology III: Neurochemistry

1. Affects the fluidity of the membranes of neurons
 - Short-term use: increasing fluidity
 - Long-term use: rigid and stiff membranes
2. **GABA** (gamma-amino-butiric acid) type A receptor
 - stimulation: reducing anxiety, sedation, memory loss, cerebellar effects, depression of brainstem vital centers
 - Long term: down-regulation of the GABA-A receptors
3. **Glutamate** receptors are inhibited – problems with learning and conditioning
 - Long-term: up-regulation of the NMDA receptors
4. **Dopamine** – reward and motivation (striatum, n. accumbens)
5. **Serotonin** – mood, anxiety, and sleep
6. Endogenous **opiates** and **cannabinoids**: reward

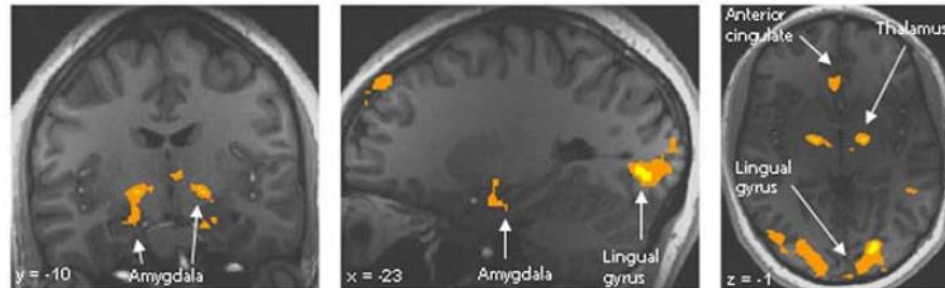
Why we *like* to drink? Activation of the reward center and dampening the effect of fearful stimuli

A Main effect of alcohol intoxication



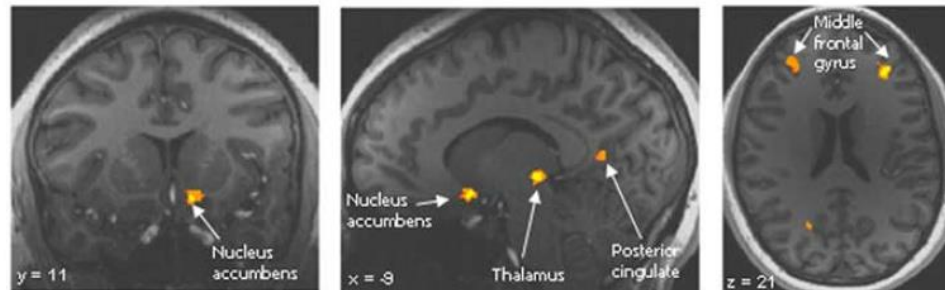
Alcohol activates striatum and **accumbens** region: reward

B Main effect of fearful faces



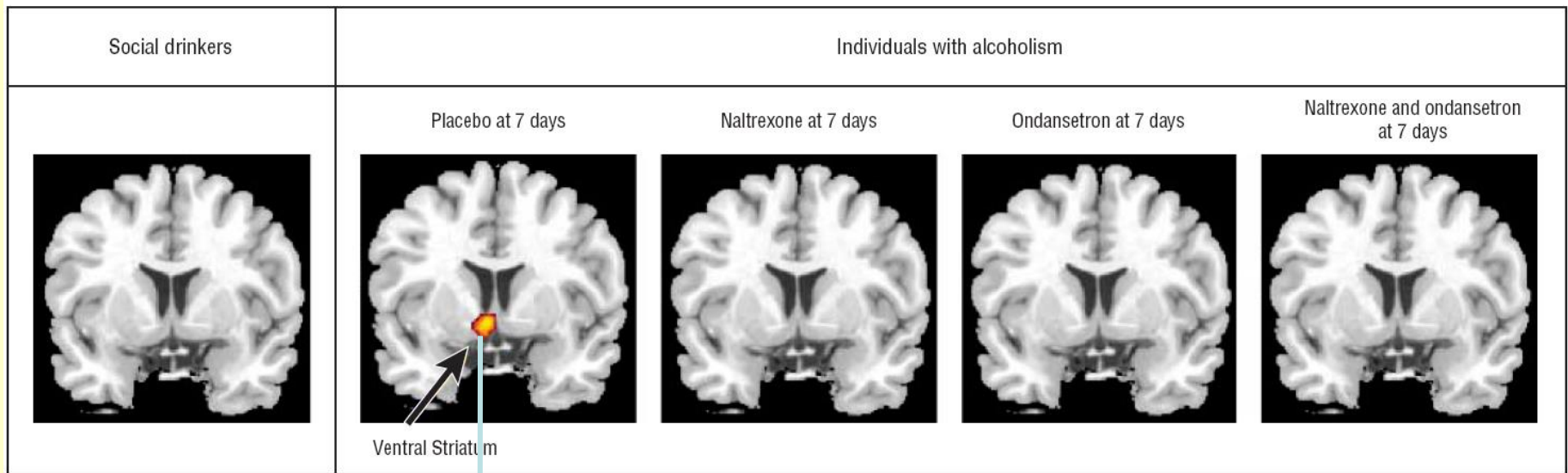
Fearful stimuli (stress) activate **amygdala**: punishment

C Interaction between alcohol and facial emotion



Alcohol dampens amygdala and enhances accumbens during the perception of fearful stimuli

Why we *want* to drink? Craving as an abnormally high motivational state and its treatment



Ventral striatum: increased motivation for alcohol-related cues (pictures)

Naltrexone: inhibits mu-opiate receptors

Ondansetron: inhibits type-3 serotonin receptors (5-HT₃)

Alcohol withdrawal

Alcohol withdrawal- pathophysiology

- **GABA inhibition theory:**

- Alcohol enhances the inhibitory chloride influx mediated by gamma-aminobutyric acid alpha (GABA-A), resulting in clinical sedation.
- Chronic alcohol use: tolerance develops because GABA receptor function is downregulated.
- Alcohol also inhibits the excitatory *N*-methyl-D aspartate (NMDA) receptor, thus diminishing the excitatory effects of glutamate, that leads NMDA upregulation on the long-term
- When alcohol is abruptly withdrawn, neurons are hyperexcitable (GABA-A activation is low, NMDA activation is high) - cause the symptoms of withdrawal.

Alcohol withdrawal - clinical presentation

1. Minor withdrawal – vegetative symptoms
2. Major withdrawal – 1 + hallucinations, seizures

+ disordered consciousness = Delirium tremens

FIGURE 1. The spectrum of alcohol withdrawal syndrome

Classification	Minor	Major		
Clinical features	Tremulousness (6-8 h)	Hallucinosi (10-30 h)	Seizures (6-48 h)	Delirium tremens (2-5 d)
4 stages of alcohol withdrawal	1. Autonomic hyperactivity	2. Hallucination	3. Neuronal excitation	4. Delirium tremens

Assesment of symptom severity: Clinical Institute Withdrawal Assesment of Alcohol Scale (CIWA-Ar)

NAUSEA AND VOMITING

Ask: "Do you feel sick to your stomach? Have you vomited?"

Observation:

- 0 No nausea and no vomiting
- 1
- 2
- 3
- 4 Intermittent nausea with dry heaves
- 5
- 6
- 7 Constant nausea, frequent dry heaves and vomiting

TREMOR

Ask patient to extend arms and spread fingers apart.

Observation:

- 0 No tremor
- 1 Tremor not visible but can be felt, fingertip to fingertip
- 2
- 3
- 4 Moderate tremor with arms extended
- 5
- 6
- 7 Severe tremor, even with arms not extended

PAROXYSMAL SWEATS

Observation:

- 0 No sweat visible
- 1 Barely perceptible sweating, palms moist
- 2
- 3
- 4 Beads of sweat obvious on forehead
- 5
- 6
- 7 Drenching sweats

ANXIETY

Ask: "Do you feel nervous?"

Observation:

- 0 No anxiety (at ease)
- 1 Mildly anxious
- 2
- 3
- 4 Moderately anxious or guarded, so anxiety is inferred
- 5
- 6
- 7 Equivalent to acute panic states as occur in severe delirium or acute schizophrenic reactions

AGITATION

Observation:

- 0 Normal activity
- 1 Somewhat more than normal activity
- 2
- 3
- 4 Moderately fidgety and restless
- 5
- 6
- 7 Paces back and forth during most of the interview or constantly thrashes about

TACTILE DISTURBANCES

Ask: "Do you have any itching, pins-and-needles sensations, burning or numbness, or do you feel like bugs are crawling on or under your skin?"

Observation:

- 0 none
- 1 Very mild itching, pins-and-needles sensation, burning or numbness
- 2 Mild itching, pins-and-needles sensation, burning or numbness
- 3 Moderate itching, pins-and-needles sensation, burning or numbness
- 4 Moderately severe hallucinations
- 5 Severe hallucinations
- 6 Extreme severe hallucinations
- 7 Continuous hallucinations

AUDITORY DISTURBANCES

Ask: "Are you more aware of sounds around you? Are they harsh? Do they frighten you? Are you hearing anything that is disturbing to you? Are you hearing things you know are not there?"

Observation:

- 0 not present
- 1 Very mild harshness or ability to frighten
- 2 Mild harshness or ability to frighten
- 3 Moderate harshness or ability to frighten
- 4 Moderately severe hallucinations
- 5 Severe hallucinations
- 6 Extremely severe hallucinations
- 7 Continuous hallucinations

VISUAL DISTURBANCES

Ask: "Does the light appear to be too bright? Is its color different? Does it hurt your eyes? Are you seeing anything that is disturbing to you? Are you seeing things you know are not there?"

Observation:

- 0 Not present
- 1 Very mild sensitivity
- 2 Mild sensitivity
- 3 Moderate sensitivity
- 4 Moderately severe hallucinations
- 5 Severe hallucinations
- 6 Extremely severe hallucinations
- 7 Continuous hallucinations

HEADACHE, FULLNESS IN HEAD

Ask: "Does your head feel different? Does it feel like there is a band around your head?"

Do not rate for dizziness or lightheadedness. Otherwise, rate severity.

Observation:

- 0 Not present
- 1 Very mild
- 2 Mild
- 3 Moderate
- 4 Moderately severe
- 5 Severe
- 6 Very severe
- 7 Extremely severe

ORIENTATION AND CLOUDING OF SENSORIUM

Ask: "What day is this? Where are you? Who am I?"

Observation:

- 0 Oriented and can do serial additions
- 1 Cannot do serial additions or is uncertain about date
- 2 Date disorientation by no more than 2 calendar days
- 3 Date disorientation by more than 2 calendar days
- 4 Disoriented for place/or person

Total score: (maximum = 67)

Rater's initials _____

Alcohol withdrawal - clinical presentation

- **Minor withdrawal (5-10 hours)**
 - Autonomic hyperactivity: tremulousness, hyperhidrosis, tachycardia, hypertension, GI upset;
 - Anxiety, insomnia, and vivid dreams
- **Major Withdrawal (12-72 hours)**
 - Hallucinations (visual, tactile) – 10-25%
 - Seizures (generalized tonic-clonic seizures) – 10%
- **Delirium tremens (48-72 hours) – 5%**
 - **Disordered consciousness**
 - **Life threatening state – medical emergency!!!!**

Alcohol withdrawal – psychopathology of delirium tremens

- Disordered consciousness, confusion
- Impaired attention, distractibility
- Disorientation in relation to time, place and person
- Hallucinations and illusions (complex, visual, tactile, auditory)
- Desorganised behaviour, agitation, violence

Alcohol withdrawal – death in delirium tremens

- Mortality: untreated cases – up to 35%
- if treated – 1-20%
- Main causes of death
 - Cardiac arrhythmia (blood electrolytes - hypokalaemia!)
 - Cardiac failure
 - Infections (pneumonia, meningitis, sepsis)
 - Concurrent medical comorbidities

Alcohol withdrawal- treatment

- Monitoring **vital parameters**, with a special reference to blood electrolytes and fluid balance (Na, K, Mg, glucose), ECG
- **Benzodiazepines** (diazepam [5-20 mg p.o. every 4-6 hour, starting dose of 10-30 mg i.v. if needed], chlordiazepoxide) – avoid in intoxication and long-term use, risk of respiratory depression and sedation
- **Thiamine** for prevention of Wernicke-Korsakoff syndrome
- **Beta blockers** (e.g. propranolol or atenolol for autonomic hyperactivity)
- **Valproate** or carbamazepine - if seizures are present
- **Haloperidol** - for hallucinations, delusions, and violence in delirium [5-10 mg p.o. or i.m.], together with benzodiazepines (risk of seizures and extrapyramidal side effects)

Physical consequences of alcohol misuse

Physical consequences of alcohol misuse

- Cirrhosis of the liver (hepatic encephalopathy)
- Pancreatitis
- Cardiomyopathy
- Peripheral polyneuropathy and myopathy
- Cerebellar degeneration
- Dementia and related nutritional syndromes (Wernicke-Korsakoff syndrome)
- Demyelination: central pontine myelinolysis, Marchiafava-Bignami syndrome (myelin loss in corpus callosum)
- Trauma (intracranial hematoma, muscle crush, Saturday night palsy)
- Increased likelihood of cancer and infections

Alcohol-related nutritional disorders

- Nutritional and absorption problems: **thiamine (vitamin B1)** deficiency in chronic alcohol dependence
- Lesions: mammillary body, fornix, thalamus, cerebellum and brainstem
- **Korsakoff's syndrome:** short-term memory impairment, confusion, and confabulation
- **Wernicke's encephalopathy:** gait ataxia, confusion, oculomotor problems - horizontal nystagmus and gaze palsy
(Wernicke's encephalopathy is reversible but can progress to Korsakoff's syndrome, coma or death; avoid rapid glucose administration BEFORE thiamine)
- Lack of folic acid: macrocytaer anaemia
- Rare: pellagra and beri-beri-like conditions

Long-term treatment of alcohol dependence

Long-term treatment of alcohol dependence: pharmacology

- **Disulfiram** (Antabuse) – inhibition of the breakdown of acetaldehyde leading to flushing, sweating and nausea – behavioral control of aversion (not to use in impulsive patients and in somatic diseases, out-of-date)
- **Acamprosate** (Campral) – reducing craving and maintaining abstinence, regulation of the glutamate system
- **Naltrexone** (ReVia) - reducing craving and maintaining abstinence, blocks opioid receptors
- Topiramate/lamotrigine: decreases the amount of alcohol intake (in Hungary, carbamazepine is also used, risk of hepatic toxicity and hematological problems)

Long-term management of alcohol dependence: psychosocial treatment and rehabilitation

- Confrontation with reality and **motivating** according to individual needs and capacity to change
- Focusing on and treatment of **co-morbid** mood and anxiety disorders (30-40%)
- **Family-level** intervention
- **Counseling** and community-level intervention:
 - motivation to maintain abstinence and prevent relapse – showing the consequences
 - cope with everyday stress
 - stimulus control and craving
 - build-up alternative lifestyle

Self-help groups

Alcoholics Anonymous (AA)

- Sober peer group, 12-step treatment from confrontation to spiritual awakening
- Role modeling of social functioning without drinking
- Peer help available 24 hours
- Strong group coherence („we-ness“)
- Religion and spirituality

potential problems: confrontation with the medical model, may be dogmatic, requires changes in view of life

Other organizations: LifeRing Secular Recovery, Rational Recovery, SMART Recovery

Thank you for your attention!