Unit 26 · Health Disorders

STUDY NOTES

WHAT NEB'S GRADE 12 EXAM ASKS

- **CDC's grid (2078):** Human Population and Health Disorders (Units 25–26 together): 4 of 75 marks; 1 short question (4 marks: understanding 1, application 1, higher ability 2)
- **The paper:** Botany 37 + Zoology 38; each part: MCQs × 1 (5 Botany, 6 Zoology) · 4 short × 4 · 2 long × 8; one OR in each short and long group; 3 hours; 1 mark per expected point
- **CDC's model paper:** MCQ on syncope (fainting from too little blood to the brain)
- **Our model papers:** Paper 2 short question (hypertension the "silent killer"; which reading is hypertension, ≥ 140/90; two daily changes to lower blood pressure, and how each helps)
- **MCQ (1 mark)**
  - disorder; cardiovascular disorders; myocardial infarction; heart failure; stroke = brain attack
  - asthma respiratory; COPD (pollutants); hypoxia; renal calculi = kidney stones (not urea); glycosuria; hemodialysis removes urea; glomerulonephritis
  - withdrawal symptoms; opium a narcotic; drug addiction; LSD; amphetamines in sport
  - beer undistilled; drink-driving: judgment, reaction time increases; liver; alcohol absorbed in the intestine
  - heated-tobacco aerosol; nicotine; smoking → emphysema; pneumonia's order; syncope
- **Short and long (in parts)**
  - types of heart disease; early signs of lung disease, in the old and infants
  - drug abuse; alcohol's effects part by part; smoking, "injurious to health"
  - socially significant diseases (long); abused drugs, sources and effects (long); alcohol addiction (long)

Key terms

Condition: a person's state of health, normal or abnormal.

Health (WHO): complete **physical, mental and social well-being**, not merely the absence of disease.

Disease: illness with a **known cause**; typical signs, symptoms, course, treatment (tuberculosis, pneumonia).

Syndrome: **signs and symptoms that occur together**, cause often unclear (**Down syndrome**: Down 1866; trisomy 21 found 1959).

Disorder: a **disturbance of normal structure or function**, causing distress or disability (arrhythmia; **substance use disorder**).

Symptom: what the patient **feels** (pain, tiredness); **sign**: what others **see or measure** (fever, BP, rash, wheeze).

Socially significant disease: harms the **people around** the patient too; substance use disorders the clearest example.

Substance abuse: harmful use of **psychoactive substances** (drugs, alcohol, tobacco); doctors now prefer "substance use".

Tolerance: more needed for the same effect; **withdrawal**: the body's reaction when it stops; **craving**.

Health disorders

- characteristics: functional impairment · signs and symptoms (or not) · distress · disability
- types: **physical** (cardiovascular, respiratory, renal) · **mental** (anxiety, depression, schizophrenia) · **genetic** (sickle-cell anemia, thalassemia, hemophilia, cystic fibrosis, Down syndrome) · **substance use**
- symptoms: physical, perceptual, sexual, interpersonal; temporary or long-lasting
- diagnosis: symptoms alone often not enough → examination, tests (blood, urine, ECG, X-ray, lung function)
- commoner with modern living, crowded polluted towns, longer lives, birth defects

Cardiovascular disorders

- heart and blood vessels; **world's leading cause of death**: **19.8 million** (2022), a third; 85% heart attacks and strokes
- causes: **lifestyle** (salt, sugar, fat; inactivity; smoking; alcohol; stress) · **conditions** (diabetes, **hyperlipidemia**, hypertension, arterio- and atherosclerosis) · **air pollution** · age, sex (men younger), obesity, family
- symptoms: **angina** (chest pain to the left arm, neck, jaw) · **dyspnea** · fatigue · dizziness, **syncope** · palpitations, swollen ankles

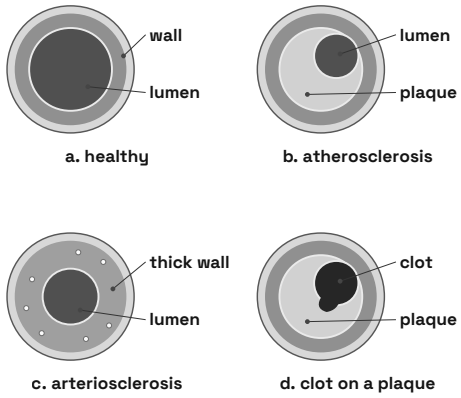
- complications: heart failure, heart attack, stroke, aneurysm, peripheral artery disease, **sudden cardiac arrest**
- WHO's four behaviors: **unhealthy diet, inactivity, tobacco, harmful alcohol**
- prevention: less salt, exercise, no tobacco, little alcohol, healthy weight, stress, check BP, sugar, cholesterol
- treatment: **stent** (angioplasty), **bypass surgery**; medicines: **aspirin**, blood thinners · **beta blockers** · **statins**

Heart

- **arrhythmia**: abnormal rate or rhythm; faulty impulses (CHD, scarring, medicines, stimulants, genes)
- **congenital heart disease**: present at birth (hole, narrowed valve)
- **heart failure**: can't pump enough; fluid in lungs, legs; heart hasn't stopped
- **myocardial infarction** (heart attack): clot in a narrowed **coronary artery** → muscle dies
- **angina pectoris**: pain on effort, eases with rest
- **cardiomyopathy**: heart muscle enlarged, thick, stiff (heavy drinking)
- **pericardial disease**: **pericarditis**, **pericardial effusion**
- **rheumatic heart disease**: **valves** damaged after **rheumatic fever** (untreated *Streptococcus* sore throat); antibiotics prevent it
- **valvular disease**: **regurgitation** (leak) or **stenosis** (narrow, stiff)

Vessels

- **aortic aneurysm**: aorta wall bulges; bursting → internal bleeding
- **arteriosclerosis**: walls **thick, hard, inelastic** (age, BP); general word
- **atherosclerosis**: **fatty plaques** (cholesterol, fat, calcium, cells) in the **inner lining**, **lumen narrowed**; crack → clot (*athērē*, porridge)
- **cerebrovascular disease**: brain's vessels narrowed; worst result **stroke**
- **coronary artery disease** (CHD, IHD): coronaries narrowed by atherosclerosis → angina, heart attack
- **deep vein thrombosis**: clot in a deep leg vein (long sitting) → may become a pulmonary embolism
- **peripheral artery disease**: legs, arms, abdomen; leg pain on walking



An artery across: healthy, atherosclerosis, arteriosclerosis, a clot on a cracked plaque.

Blood flow

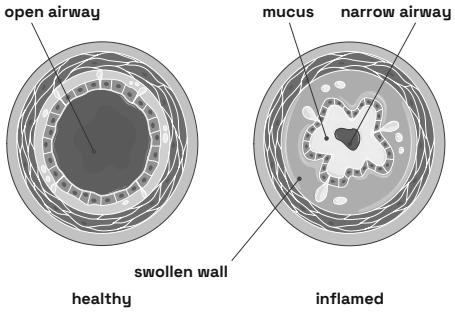
- **hypertension**: stays ≥ **140/90 mmHg** (some 130/80); **"silent killer"**: no symptoms for years → heart attack, stroke, kidney failure; **180/120+ = hypertensive crisis**
- **hypotension**: below ~**90/60**; blood or fluid loss, anemia, heart, widened vessels; dizzy, faint; sudden dangerous fall = **shock**
- **stroke** (CVA, brain attack): brain cut off from blood; **ischemic** (clot, most) or **hemorrhagic** (vessel bursts); drooping face, weak arm, slurred speech; treat within hours
- lowering BP: **less salt** (less water held in the blood), **exercise**, no smoking, little alcohol, healthy weight, less stress

Respiratory disorders

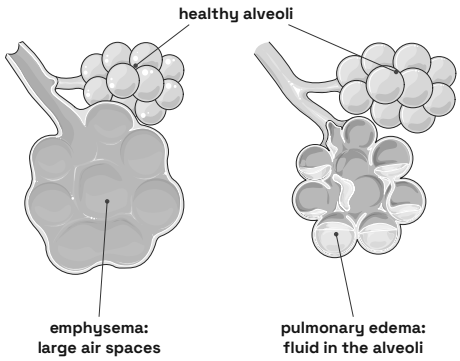
- airways, lungs, their vessels, pleura; **COPD ~3.5 million** deaths (2021)
- causes: infections; **smoking**; polluted air, **cooking-fire smoke**, work dusts
- symptoms: breathlessness, cough, wheeze, chest pain, tiredness
- complications: infections, **pneumonia**, **lung abscess**, **acute respiratory failure**, **lung failure**
- risk: environment, genes, smoking, age (very young, old), asthma, diabetes
- prevention: cleaner stoves, kitchen ventilation, masks, exercise, no tobacco, **vaccines** (influenza, pneumonia, whooping cough, **BCG**)
- treatment: antibiotics, **oxygen therapy**, breathing exercises; **bronchodilators** (blue inhaler), **inhaled steroids**, oral corticosteroids
- **hypoxia**: too little oxygen reaching the tissues

Where	Disorder	What happens
airways	**asthma**	inflamed, oversensitive; trigger → **smooth muscle** tightens, lining swells, mucus → **wheeze**; inhalers
	bronchiectasis	bronchi **permanently widened**, mucus collects, reinfected
	bronchitis	bronchi inflamed, too much mucus; **acute** ≤ ~3 weeks; **chronic**: cough with phlegm **3 months a year, 2 years running** (a COPD)
	COPD	air **out** blocked; **chronic bronchitis + emphysema**; tobacco, cooking-fire smoke; incurable
	laryngitis / **pharyngitis**	larynx (hoarse) / throat (sore; virus, sometimes *Streptococcus*)
alveoli	**lung cancer**	uncontrolled growth, mostly lining of bronchi; **8–9 in 10 from smoking**
	pneumonia	infection inflames alveoli, fill with fluid, pus (*S. pneumoniae*, viruses incl. COVID-19, fungi); **under-fives**, old
	pulmonary edema	fluid into alveoli; failing **left heart**; can't lie flat, frothy cough
	tuberculosis	*Mycobacterium tuberculosis*, by air; **tubercles**, cheesy centers, **cavities**; cough > 2 weeks, fever, night sweats, weight loss; cured by **6 months** of medicines (free in Nepal)
whole lung	**ARDS**	sudden severe injury, alveoli flooded (pneumonia, COVID-19, sepsis); ventilator
	emphysema	**walls between alveoli destroyed** (smoking) → few large spaces; less surface, **elastic recoil** lost; air trapped
interstitium	**interstitial lung disease**	tissue round alveoli inflamed, **scarred**
vessels	**pulmonary embolism**	clot (DVT) blocks a **pulmonary artery**
	pulmonary hypertension	high pressure in pulmonary arteries; right heart fails
pleura	**pleural effusion**	fluid between the layers; drained
	pleurisy	pleura inflamed; sharp pain breathing in
	pneumothorax	**air** in the pleural space → lung **collapses** (tall thin young men, smokers)
	mesothelioma	pleural cancer, **asbestos**
other	**cystic fibrosis**	**inherited** (*CFTR*): thick mucus → repeated infections (not the other way)
	pulmonary fibrosis	lung scarred, stiff
	occupational	**silicosis** (silica: stone crushing, quarries, brick kilns), **asbestosis**

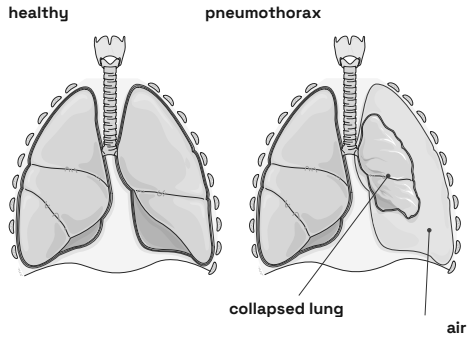
- pneumonia's order: alveoli fill with fluid → breathless → alveoli damaged → tissue thickens



A bronchus: healthy and inflamed.



Alveoli in emphysema and in pulmonary edema.

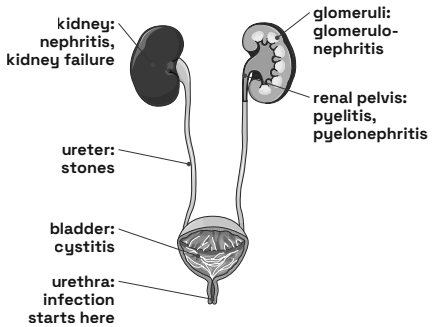


Pneumothorax: air in the pleural space, the lung collapsed.

- warning signs: cough > 3 weeks (2 for TB), blood or much mucus, breathless on light effort, wheeze, chest pain, tiredness, weight loss
- **old**: COPD, lung cancer, pneumonia, pulmonary edema · **infants**: pneumonia, bronchiolitis, asthma, whooping cough, TB (narrow airways, immunity developing)

Renal disorders

- kidneys damaged or can't filter; **CKD ~1.5 million** deaths (2021), rising
- causes: salt, alcohol, inactivity · **diabetes**, **high BP** (damage glomeruli), infections, stones, painkillers for years · age, sex, family
- symptoms: urine changes (more, less, foamy, blood), **swelling** (feet, ankles, face), high BP, headache, nausea, tiredness, itching; early often **none** → blood, urine tests
- complications: **fluid retention** (swelling, BP, pulmonary edema) · heart disease (pericarditis, high K^+, heart attack, stroke) · **kidney failure** → **dialysis** or **transplant**
- medicines: **diuretics**, beta blockers, ACE inhibitors, **insulin**, **metformin**
- **hemodialysis** removes **urea**, other wastes, salts, water across a membrane
- **glycosuria**: sugar in urine; diabetes mellitus



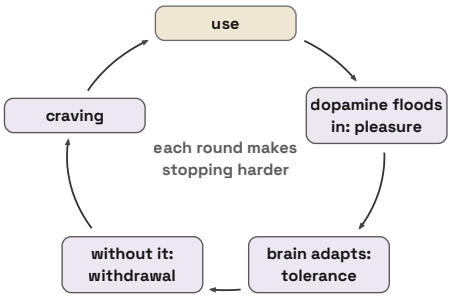
Where urinary disorders strike.

Where	Disorder	What happens
kidney	**ESRD**	last stage of CKD, < ~15% working; fatal without dialysis or transplant
	nephritis	kidney inflamed (infection, immune, genes, drugs)
	nephroptosis	"floating kidney" drops on standing (weight loss, pregnancy, injury)
	polycystic kidney disease	inherited; fluid cysts in both kidneys
	renal failure	**acute** (sudden, often reversible) or **chronic** (years)
	uremia	**urea** builds up in blood
glomeruli	**glomerulonephritis** (Bright's disease)	glomeruli inflamed; blood, protein in urine; **immune**, after *Streptococcus* throat or skin infection
	nephrosis (nephrotic syndrome)	much **protein** lost, body swells
tract	**renal calculi** (kidney stones, nephrolithiasis)	salts crystallize; mostly **calcium oxalate** (uric acid, calcium phosphate, struvite); in the ureter: **renal colic**; drink water
	cystitis	bladder lining inflamed; burning, frequent urine
	pyelonephritis	kidney and pelvis infected, from the bladder; fever, back pain
	UTI	mostly urethra, bladder; *E. coli*; **women** far more (urethra ~4 cm vs ~20 cm)
pelvis	**pyelitis**	renal pelvis inflamed (*E. coli*)

Substance abuse

- **DSM-5** (2013): **ten classes**: alcohol, caffeine, cannabis, hallucinogens, inhalants, opioids, sedatives/hypnotics/anxiolytics, stimulants, tobacco, other

- **physical dependence**: body adapted; stopping → **withdrawal** (shaking, sweating, pain, vomiting, sleeplessness, fits); with **tolerance**
- **psychological dependence**: intense **craving**
- each use floods the **reward pathway** with **dopamine** → wanting again → tolerance → withdrawal → craving



How a habit becomes addiction.

Drug abuse

- **drug** (WHO): substance used to change or explore body working or a disease, for the person's benefit
- **drug use**: under a doctor's advice · **drug abuse**: no medical reason, harmful amounts; some control kept
- **drug addiction**: compulsive use, a brain disorder · **drug dependence**: need it continuously → **drug use disorder** (long-lasting, **relapsing**)
- **26 June**: International Day against Drug Abuse (UN, 1987)
- Nepal Drug Users Survey 2076 (2019/20): **~1,30,000** users; 93% male; 76% under 30; cannabis 85%, tranquilizers 73%, opiates 47%; ~3 in 10 inject; **89% peer pressure**
- **depressants** ("downers"): alcohol, opioids, tranquilizers, sedatives; together they add up (can stop breathing)

Type	Group	Does	Examples
psychotropic (mind-altering)	**narcotics** (opioids)	dull senses, relieve pain, deep sleep; excess → stupor, coma, breathing stops	opium, morphine, codeine, heroin, oxycodone
	tranquilizers (anxiolytics)	calm anxiety, **not unconscious**	diazepam, chlordiazepoxide, alprazolam
	sedatives	calm, then dull; high doses unconscious	barbiturates, lorazepam, GHB, zolpidem
	hypnotics (soporifics)	bring **sleep** (insomnia)	phenobarbital, secobarbital
	stimulants ("uppers")	alert, energetic; **sympathetic** up	caffeine, cocaine, amphetamines, nicotine
psychedelic	**hallucinogens**	change perception: **hallucinations**, **illusions**	cannabis (large doses), LSD

- **opium**: dried **latex** of the unripe capsule of *Papaver somniferum*, by **lancing**
- **natural** alkaloids: **morphine** (~1/10 of opium), **codeine**; **semi-synthetic**: **heroin** (diacetylmorphine, "brown sugar"), **oxycodone** (from **thebaine**); **synthetic**: pethidine, methadone, tramadol, **fentanyl**
- **caffeine**: tea (*Camellia sinensis*), coffee (*Coffea arabica*); cocoa (*Theobroma cacao*): **theobromine**; Ilam tea, mid-hill coffee
- **cocaine**: from **coca** leaves (*Erythroxylum coca*, Andes); stimulant, first local anesthetic; listed as a "narcotic" in law
- **amphetamines**: synthetic; ADHD, **narcolepsy**; "anti-sleep" pills; **banned in sport**; methamphetamine
- mild stimulants: tea, coffee, chocolate; strong: cocaine, amphetamines
- **cannabis** (*Cannabis sativa*, ganja): **THC** in the **resin** of **trichomes** on female flowers
  - **bhang** (leaves, shoots, paste) · **ganja** (flowering tops of unfertilized female) · **marijuana** · **hashish** (pressed resin) · **charas** (resin rubbed by hand)
  - illegal since the **Narcotic Drugs (Control) Act, 2033 (1976)**; enforced by the **Narcotics Control Bureau**
- **LSD**: from **lysergic acid** of **ergot** (*Claviceps purpurea*, on rye); micrograms enough; most powerful
- ways: swallowing, smoking, snorting, **injecting** (HIV, hepatitis), suppositories
- reasons: curiosity · availability · **peer pressure** · escaping pain · pleasure · mental health · stress · genes · life changes · family, society · lack of awareness

- signs: appearance, weight, eating, sleep; drowsy, runny nose, slurred speech; bloodshot eyes, odd pupils; mood (agitated, **paranoia**); withdrawn, secretive; **drug-seeking** (many doctors); money, legal trouble
- effects: nausea, weight loss; **liver**; seizures, stroke, brain damage; lungs; **hepatitis B**, **C**, **HIV**; depression, suicide, **neurosis** (milder, knows what is real), **psychosis** (loses touch with reality); **overdose**; school, job, family, crime
- prevention: help early, **say no**, never try, healthy life, family bonds, coping with stress, only prescribed medicines, hobbies, awareness
- treatment: **counseling** · medicines (**opioid substitution**: **methadone**, **buprenorphine**) · both together (best) · **rehabilitation** with **detoxification**
- **cold turkey** = stopping suddenly (dangerous for alcohol, sleeping pills); not locking up

Alcohol abuse

- alcohol: –**OH** on carbon; methanol CH_3OH, **ethanol** C_2H_5OH, propanol, isopropanol
- drinks: **ethanol**, from **fermentation** of sugars by **yeast**; ≥ 9,000 years (Jiahu, China, ~7000 BCE)
- **methanol**: ~10 mL can blind, more kill (→ formic acid); "poisonous liquor"
- 1 g ethanol (~1.27 mL, density 0.789) → **7 kcal**, empty
- absorbed: ~1/5 **stomach**, most **small intestine**; **~90% broken down in the liver**; rest in breath, sweat, urine
- psychoactive, toxic, dependence-producing; **most abused substance**; WHO: **no safe level**
- Nepal STEPS 2019: ~7% drink harmfully (≥ 60 g a day): 12% men, 2% women; world 2.6 million deaths (2019)
- **alcohol use disorder** (alcoholism); withdrawal: shaking, sweating, anxiety, fits, **delirium tremens**
- **ABV**: % of volume ethanol

Kind	Drink	From	ABV
undistilled (yeast stops ~15%)	**beer**	malted barley (wheat, maize, rice, oats)	4–6%
	wine	grape juice	12–14%
	jaand (chhyang), tongba	rice, millet with *marcha*	–
distilled (alcohol boils at 78 °C)	gin	grain, juniper	35–55%
	brandy	**wine**	35–60%
	whiskey	grain, aged in casks	40–50%
	rum	**sugarcane**, molasses	~40%
	tequila	**blue agave**	~40%
	vodka	grain or **potatoes**	~40%
	raksi	millet, rice	–

- drunk neat or diluted; vapor very dangerous
- AUD by **DSM-5**'s eleven criteria (past year): **mild** 2–3, **moderate** 4–5, **severe** 6+
- reasons: curiosity, easy to get, peer pressure, mental health, pleasure, stress, **family history**, lack of awareness
- signs: withdrawal, craving, lasting physical problems, mood, **tolerance**, harms relationships, more than meant, hangovers, drinking to cure one, fails duties, gives up activities, dangerous drinking (driving), despite illness

Effects

1. **depressant** of the CNS: restraint first, then slow reactions, judgment; coma, breathing stops
2. **cerebellum**: **ataxia**, slurred speech
3. **less ADH** → more urine, dehydration (hangover)
4. desire up, performance down (*Macbeth*)
5. **blood pressure** up; **alcoholic cardiomyopathy**
6. liver: **fatty liver** → **alcoholic hepatitis** → **cirrhosis** (scarred, fails)
7. **GGT** raised (test)
8. **vitamin B_1** (thiamine) lacking → **Wernicke's encephalopathy**, **Korsakoff syndrome**
9. hangovers, withdrawal
10. **carcinogen**: mouth, throat, esophagus, liver, bowel, breast
11. poisoning; pancreas, stomach inflamed; accidents, violence; **fetal alcohol syndrome**

- feels warm (skin vessels widen) but cools **faster**, shivering dulled → **hypothermia**

- driver: judgment worse, **reaction time increases**
- part by part: brain (judgment, memory, cerebellum, shrinkage) · head (hangover) · heart (BP, arrhythmia, cardiomyopathy) · eyes (blurred, double) · liver · stomach, gut (gastritis, ulcers, B_1, pancreas, cancers) · waist (empty calories) · bones (osteoporosis, falls)
- prevention: none while young; avoid high-risk drinking ($\leq$ 1–2 standard drinks, days without, less for women); never drink and drive or with depressants; manage stress (relapse)
- treatment: hospital or **residential rehabilitation** (supervised withdrawal) · behavioral · **Alcoholics Anonymous** · **naltrexone**, **acamprosate**, **disulfiram**, topiramate, gabapentin

Smoking (tobacco) abuse

- *Nicotiana tabacum* (and stronger *N. rustica*), **Solanaceae**; from **South America**
- smoke: **>7,000 chemicals**; **carbon monoxide** (takes oxygen's place on hemoglobin), hydrogen cyanide, benzene; **~70 carcinogens** (**tar**'s hydrocarbons, formaldehyde, acetaldehyde, arsenic, cadmium, nickel)
- **nicotine**: **addictive**, not the main cause of cancer (tar, other chemicals); releases **adrenaline**, **dopamine**; reaches the brain in **10–20 s**; stimulates and calms; **craving–relief cycle**
- kills **> 7 million** a year, **~1.6 million non-smokers** (WHO); leading **preventable** cause of death
- **31 May**: **World No Tobacco Day** (WHO, 1988)
- Nepal STEPS 2019: **17%** smoke (28% men, 7.5% women); nearly half of men use tobacco in some form; warnings cover 90% of packets
- **Tobacco Products (Control and Regulation) Act, 2068 (2011)**: no smoking in public places, offices, transport; no sale under **18**
- smoking: cigarette, cigar, pipe; **bidi** (tendu leaf), **churot**, **chilam**, **gadgada**, **hookah**
- smokeless: **sniffing** (snuff; naswar) · **sucking** (**khaini** with slaked lime; snus) · **brushing** (**gul**) · **chewing** (jarda, patti in **paan**; **gutkha**: areca nut, lime, catechu, tobacco → **mouth cancer**)
- modern: **heated tobacco aerosol**, **e-cigarettes**: still nicotine, not harmless
- tobacco seeds ~12,300 years old (Utah)
- reasons: **starting young** (most before 18), friends and family, mental health, other substances, genes
- signs: pleasure, can't stop, avoids smoke-free events, despite illness, stained fingers and teeth, bad breath, smoker's cough; withdrawal: shaky, sweating, irritable, fast heartbeat, anxious, sleepless, craving; **triggers** (after meals, with tea)
- effects:
  1. **CVD**: CAD, heart attack, peripheral artery disease, **Buerger's disease** (gangrene)
  2. **COPD**, chronic bronchitis, **emphysema**, **lung cancer**
  3. cancers of mouth, throat, esophagus, stomach; **peptic ulcers**
  4. **stroke**
  5. small, early, stillborn babies; children: pneumonia, asthma
- diagnosis by questions (a cigarette within half an hour of waking: strong dependence)
- prevention: help early, refuse firmly, watch for **relapse**; laws: taxes, picture warnings, smoke-free places, no ads, no sale to children
- treatment: **counseling + medicines** (most successful); quit lines; **CBT**; **NRT** (gum, patches, lozenges, sprays, inhalers); **varenicline**, **bupropion**, **cytisine** (nortriptyline, clonidine)

COMMON MISTAKES

✗ A syndrome has a known cause
✓ a **disease** has; a syndrome is a pattern whose cause may be unclear.

✗ Hypertension begins at 180/120 mmHg
✓ at **140/90**; 180/120 is a **crisis**; hypotension below **~90/60**.

✗ Arteriosclerosis and atherosclerosis are the same
✓ athero = **fatty plaque** narrowing the lumen; arterio = any hardening.

✗ Heart failure means the heart has stopped
✓ it **can't pump enough**; stopping is cardiac arrest.

✗ Cystic fibrosis is caused by repeated lung infections
✓ it is **genetic**; its mucus **causes** the infections.

✗ In emphysema the alveoli fill with fluid
✓ their **walls are destroyed**; fluid is pulmonary edema.

✗ Morphine is semi-synthetic
✓ **natural** alkaloid; heroin and oxycodone are semi-synthetic.

✗ Cocaine is a narcotic drug pharmacologically
✓ a **stimulant**; only the law calls it a narcotic.

✗ Cold turkey means locking an addict up
✓ it means **stopping suddenly**.

✗ Nicotine causes the cancer
✓ **tar** and other chemicals do; nicotine **addicts**.

✗ Alcohol keeps you warm
✓ it makes you **lose heat faster** (hypothermia).

✗ Most alcohol is absorbed in the stomach
✓ most in the **small intestine**.