Dysbarism – High Yield Summary

Definition

- Dysbarism = **pathological changes due to rapid changes in environmental pressure.**
- Caused by **abnormal behavior of gases in the body.**
- Based on **inverse relationship** between pressure and gas volume (↑ pressure → ↓ volume, and vice versa).

(Important Concepts) ضغط البيئة

- Normal pressure at sea level = 1 atmosphere (760 mmHg)
- Every 10 meters depth = +1 atmosphere (ATA)
- Hyperbaric exposure → ↑ pressure
- Hypobaric exposure → ↓ pressure

👉 Prevention:

- Gradual return to normal pressure(slow decompression)

Main Dysbaric Disorders

1. Nitrogen Narcosis (Inert Gas Narcosis)

- Occurs in **deep diving with compressed air**
- Due to ↑ **partial pressure of nitrogen** → dissolves in brain (lipid soluble)

Onset

- **At 20–30 m (3–4 ATA)**

Symptoms (like alcohol intoxication)

- Euphoria
- Impaired judgment & intellectual function
- Incoordination

👉 Called: "**Rapture of the depth"**

Severe

- **At 90 m (10 ATA) → loss of consciousness + high risk of death**

Worsened by

- Cold water
- ↑ CO_2 (hypercarbia)
- Fatigue, exertion
- Alcohol

Recovery

- Rapid and complete with ascent (decompression)

2. High-Pressure Nervous Syndrome (HPNS)

- Occurs in **very deep diving (>100 m)** using helium-oxygen mixtures

Cause

- Direct effect of **high** pressure on CNS

Symptoms

- CNS hyperexcitability
- Euphoria
- Headache, vertigo
- Nausea, vomiting
- Tremors, hyperreflexia
- Sleep disturbance

3. Barotrauma

- **2nd leading cause of death in divers**
- Due to **failure of gas-filled spaces to equalize pressure**

Affected sites

- Lungs (alveoli)
- Middle ear
- Sinuses
- Stomach
- Dental fillings

Barotrauma

A. Barotrauma of Descent (Squeeze)

- Middle ear squeeze
- Sinus squeeze
- Inner ear squeeze

👉 Prevention:

- Decongestants
- Anti-inflammatory sprays

B. Barotrauma of Ascent (Reverse Squeeze)

- Arterial Gas Embolism (AGE)
- Pneumothorax
- Gastric rupture
- Subcutaneous emphysema
- Pneumomediastinum
- Pneumopericardium

4. Arterial Gas Embolism (AGE)

- Gas bubbles enter arterial circulation

Presentation

A. CNS symptoms (most common)

- Immediate onset after surfacing
- Vertigo, confusion
- Aphasia, hemiplegia
- Convulsions, coma

B. Cardiovascular collapse

👉 Key facts:

- Brain is main target
- 5% mortality
- 60% improve rapidly with recompression
- **Permanent restriction from diving**

5. Decompression Sickness (DCS)

- **2nd cause of death**
- Due to gas bubble formation in tissues and blood

Mechanism

- ↑ pressure → ↑ nitrogen dissolved in tissues
- Rapid decompression → nitrogen forms bubbles

👉 Affects:

- Nervous tissue
- Bone marrow
- Fat

Timing

- Symptoms appear 6–48 hours (delayed)

👉 Unlike AGE (immediate)

Types of DCS

Type I (Mild – Bone & Skin)

- Joint pain
- Skin rash, itching (diver's lice)
- Better prognosis

Type II (Severe – Neurological)

- Back pain → paresthesia → weakness
- Urinary retention
- Paralysis
- Speech problems, convulsions, coma

Pulmonary DCS ("Chokes")

- Cough
- Dyspnea
- Chest pain

👉 May progress to:

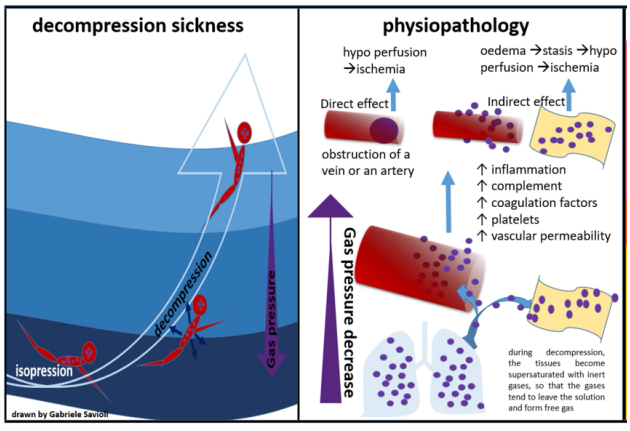
- Pulmonary edema
- Collapse & death

Inner Ear DCS

- Vertigo
- Tinnitus
- Hearing loss

Type III (Chronic)

- Dysbaric osteonecrosis
- Affects long bones (fatty marrow)
- Seen in divers & caisson workers



Treatment (VERY IMPORTANT)

- **<u>Immediate recompression = most important step</u>**

Hyperbaric Chamber

- Increase pressure → shrink bubbles
- Give **100% O_2** → **enhances gas elimination**

Additional

- Slow decompression schedule
- Heparin if needed
- Symptomatic treatment

Key Exam Points 🔥

- Dysbarism = pressure change + gas behavior
- Nitrogen narcosis → alcohol-like symptoms
- AGE → immediate CNS symptoms (dangerous)
- DCS → delayed symptoms (6–48h)
- Barotrauma = failure of pressure equalization
- Treatment = recompression + O_2