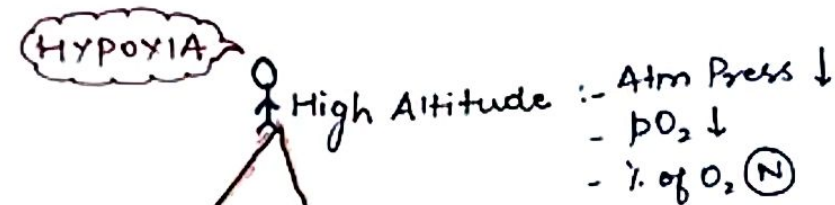


HIGH ALTITUDE PHYSIOLOGY

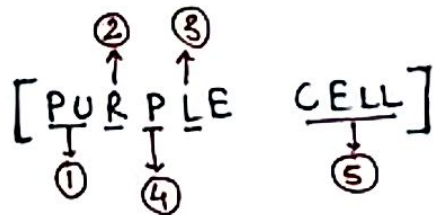


Sea Level :- Atm Press = 760 mmHg (1 atm)
- 21% O_2
- pO_2 = 160 mmHg

Physiological adaptation
to new altitude

↓
ACCLIMATIZATION

- ① ↑ in pulmonary ventilation
- ② ↑ in no. of RBC's
- ③ ↑ diffusing capacity of lungs
- ④ ↑ vascularity of peripheral tissues



- ⑤ Cellular acclimatization [↑ ability of tissues to use O_2 despite low pO_2]

↑ no. of RBC

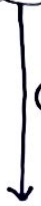
Hypoxia Inducible Factor :- AKA :- **MASTER SWITCH** of Hypoxia.



→ DNA binding transcription factor

{ Normal :- Downregulated }
{ Hypoxia :- Upregulated }

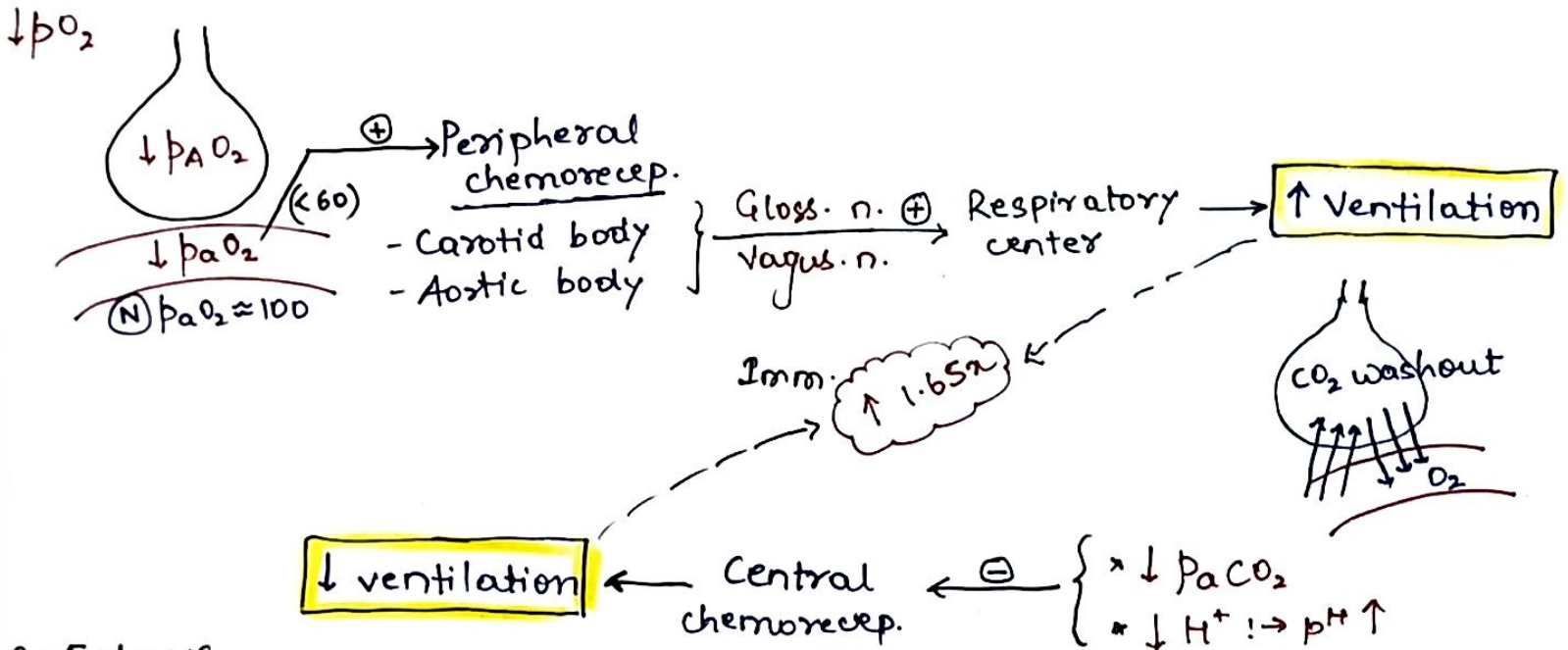
HYPOXIA ⊕



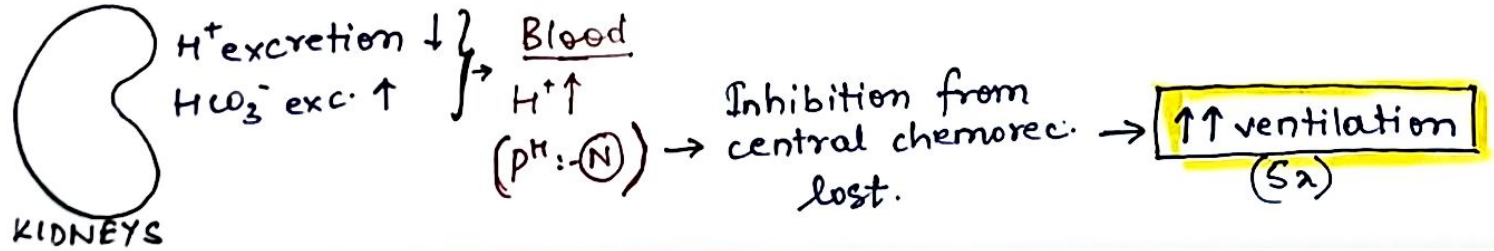
- ✓ Erythropoietin gene ⇒ ↑ EPO → ↑ RBC production
- ✓ VEGF gene (Vasc. Endoth. Growth factor) ⇒ Angiogenesis → ↑ vascularity
- ✓ Mitochondrial gene ⇒ ↑ cellular oxidation despite low pO_2 → Cellular acclim.
- ✓ Genes of glycolytic enzymes ⇒ ↑ 2,3-DPG_i ⇒ Rt. shift of OHDC (↓ affinity of O_2)
More release of O_2 to tissues
- ✓ Genes increasing NO ⇒ Pulmonary vasodilation

VENTILATION

Hypoxemic hypoxia $\xrightarrow{\text{Immed.}}$ \uparrow ventilation (1.65x) $\xrightarrow{\text{after 2-5 days}}$ \uparrow ventil. (5x)



2-5 days



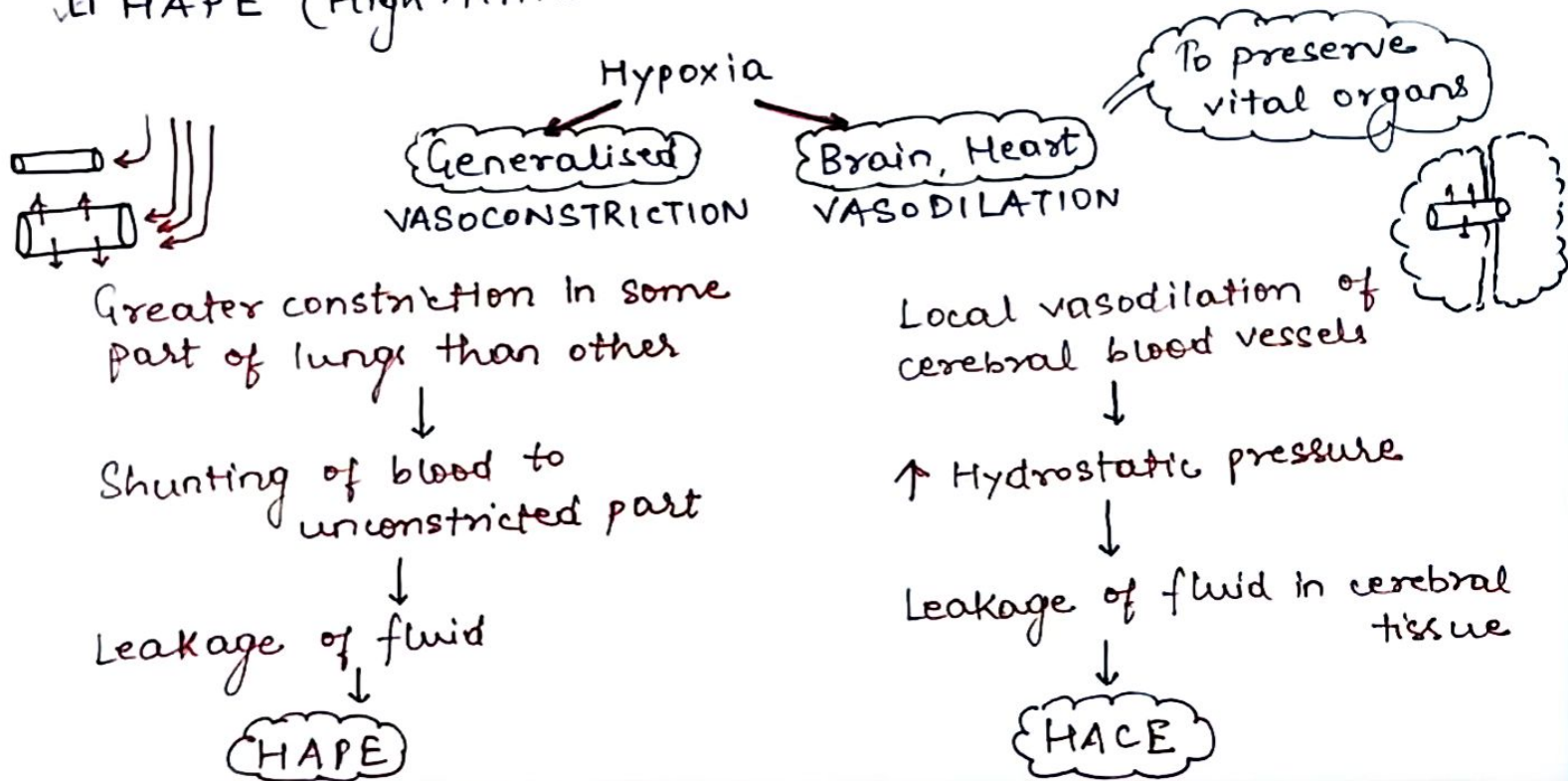
ACUTE MOUNTAIN SICKNESS

(D/t rapid ascend to high altitudes)

From :- Within 2 hrs
To :- upto 2 days

Effects :-

- ✓ HACE (High Altitude Cerebral Edema)
- ✓ HAPE (High Altitude Pulmonary Edema)



FEATURES

- 1) Cough \bar{c} Blood in Sputum
- 2) Headache
- 3) Inability to walk
- 4) Cyanosis
- 5) Congestion of chest
- 6) Confusion
- 7) Consciousness \downarrow
- 8) Dyspnea

[Bloody Head In CCCCD]

Prevention & Tx :-

- * Descend to lower altitude
- * Slow ascent to facilitate acclimitiz
- * O₂ therapy
- * CCB (Nifedipine)
- * Dexamethasone

CHRONIC MOUNTAIN SICKNESS :-

(High Altitude for long duration)

Effects :-

* ↑ RBC
↑ Hematocrit

→ ↑ Blood viscosity

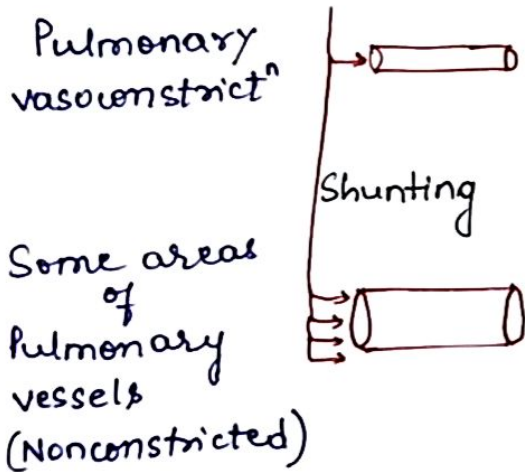
→ ↓ Blood flow

① ↓ O₂ delivery

$$R = \frac{8\eta L}{\pi r^4}$$

↑ viscosity
↓ Resistance

* Hypoxia



Prolonged Hypoxia

Complete pulmonary vasoconstriction

(Pulmonary HTN)

② ↑ pulmonary arterial pressure

③ Rt. Side Congestive Heart failure

④ Death.

Tx :- Lower Altitude ; Acetazolamide.