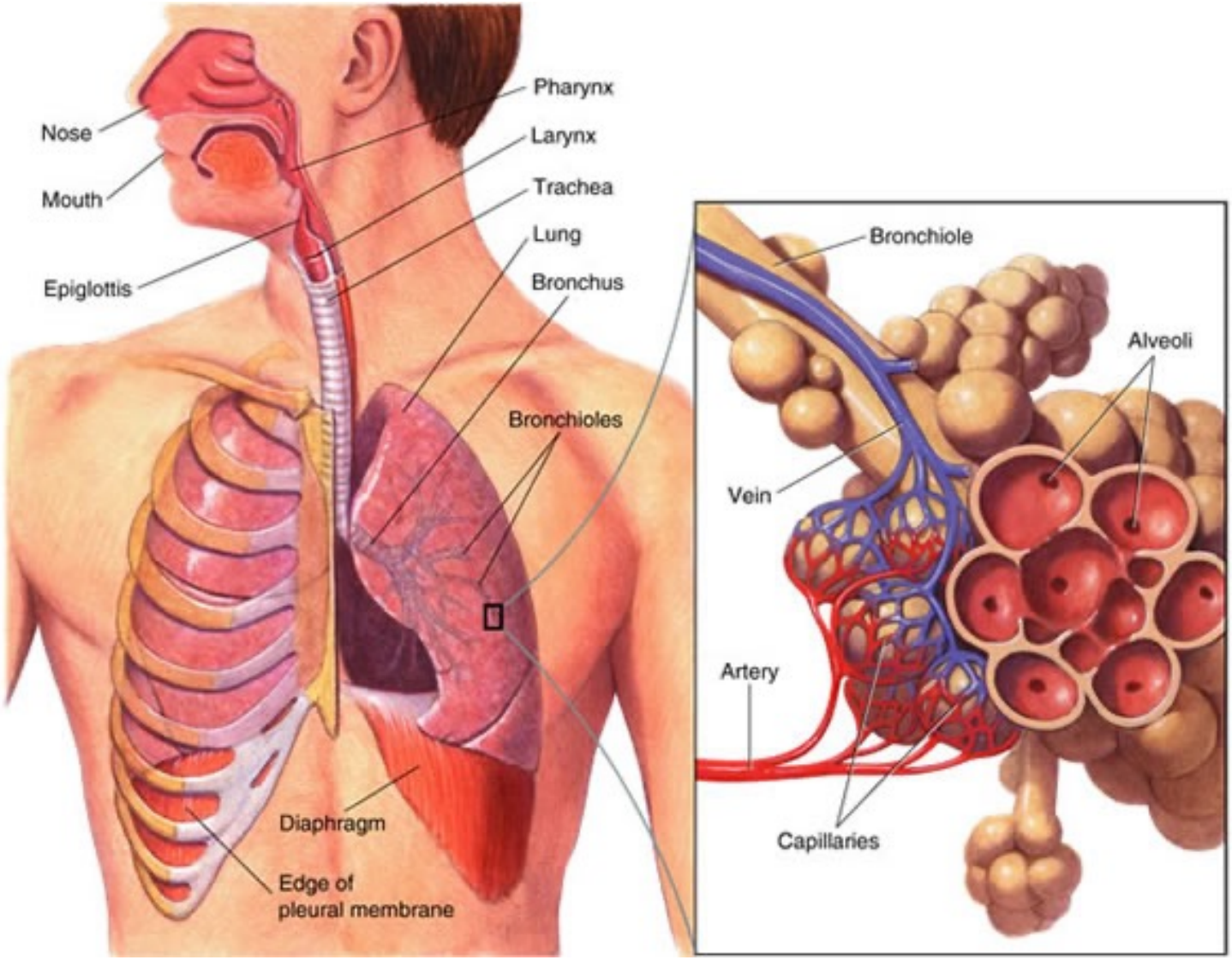
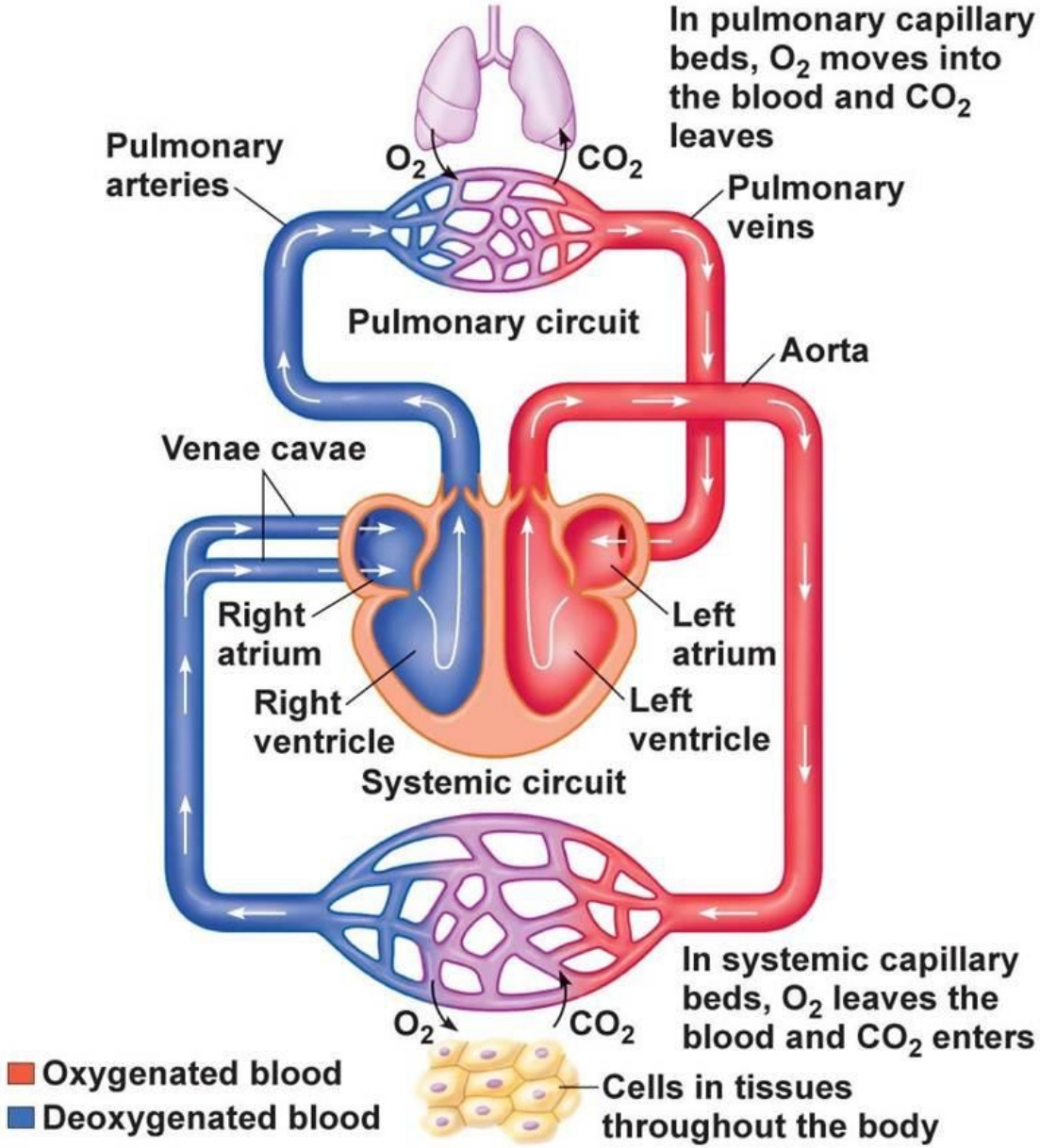
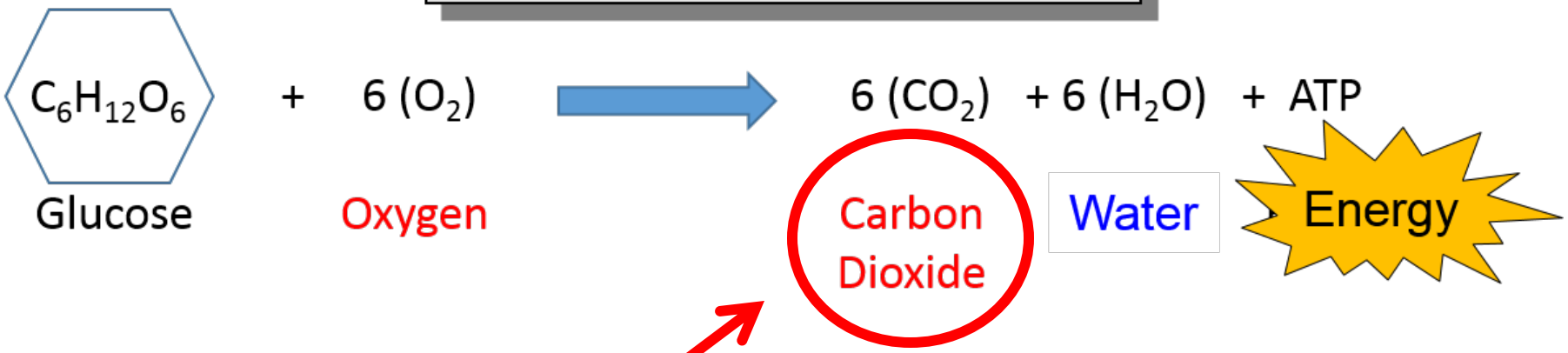
Capnography


Let's have a moment of
SCIENCE


Nose
Mouth
Epiglottis
Pharynx
Larynx
Trachea
Lung
Bronchus
Bronchioles
Diaphragm
Edge of
pleural membrane
Bronchiole
Alveoli
Vein
Artery
Capillaries



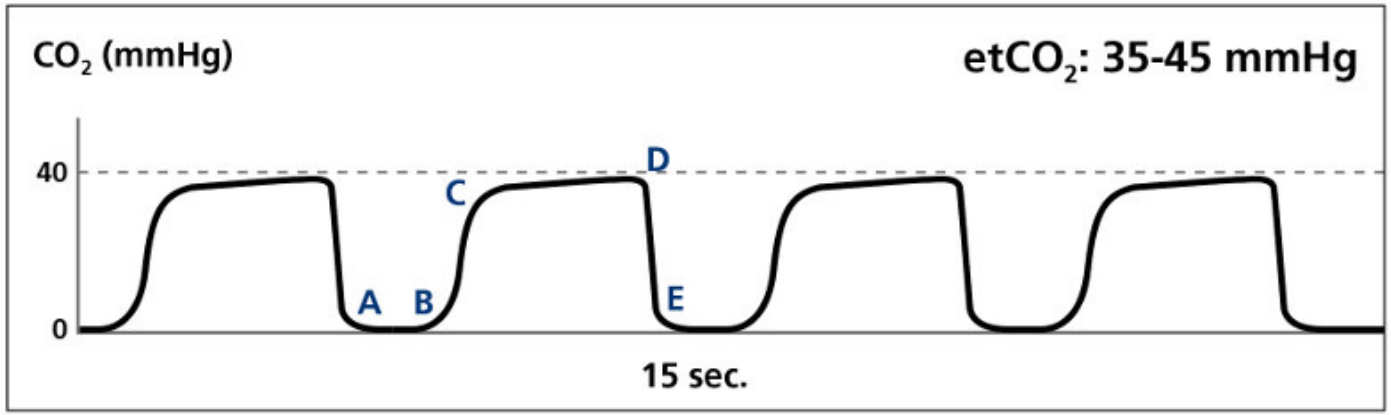
Cellular Metabolism



Marker of Cellular Function and Oxygen Delivery

Capnography is a VITAL sign

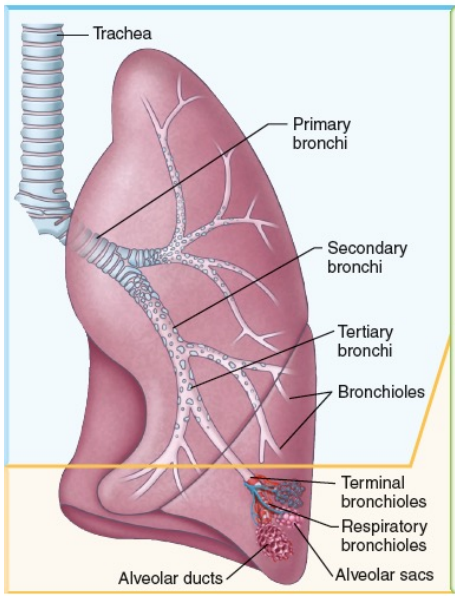
Normal Capnograph

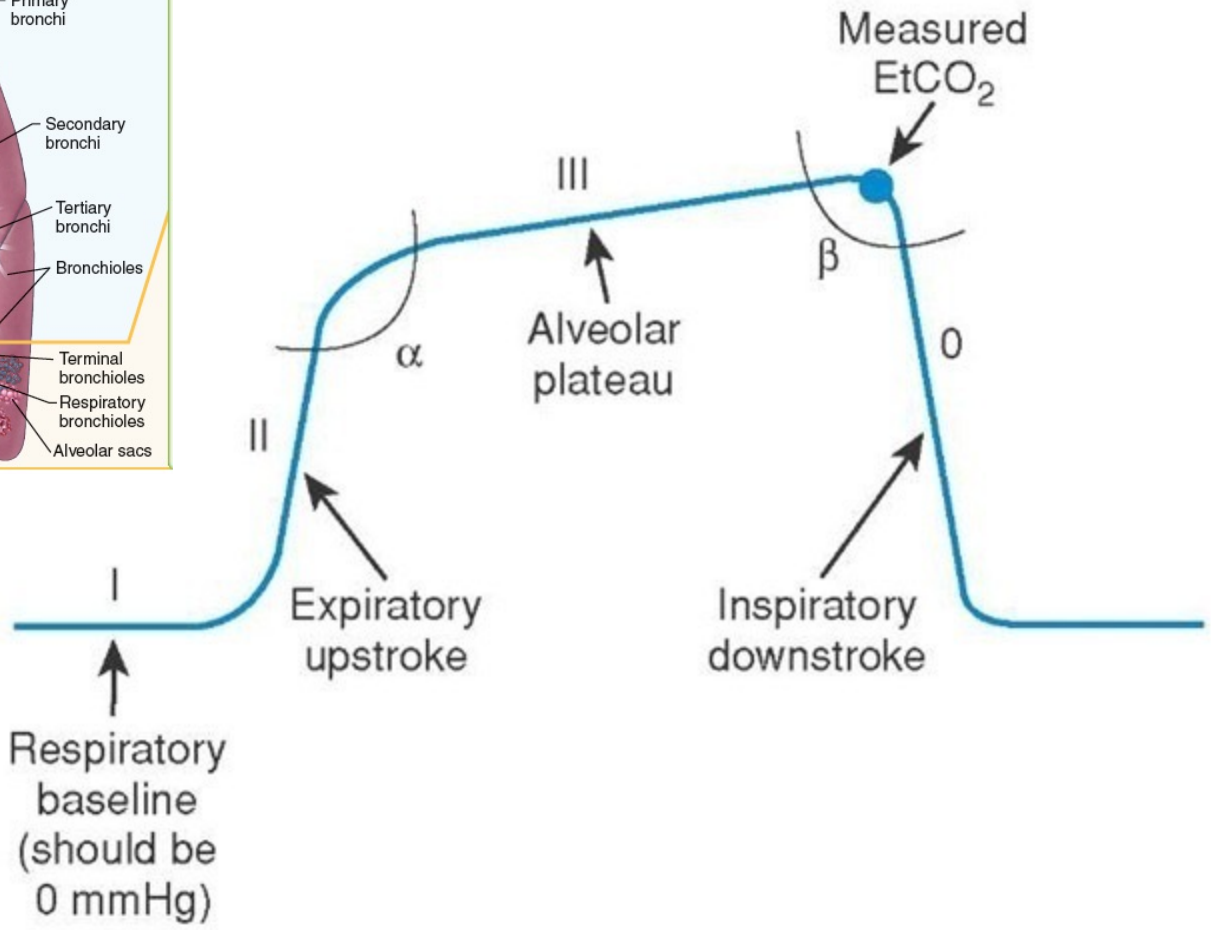


Excellent insight into ventilation, perfusion and metabolism

Normal ETCO2 = 35-45

4 Phase of Capnography





Hyperventilation

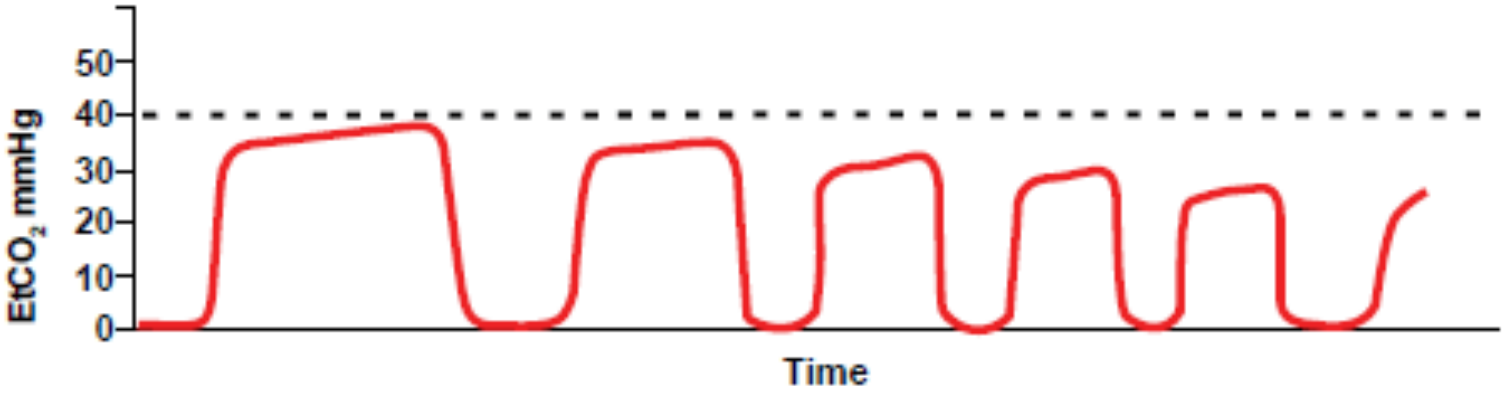


Figure 9: Capnogram illustrating hyperventilation.

- Increased Respiratory Rate
- Decreased ETCO2
- Decreased waveform amplitude and width

Hypoventilation

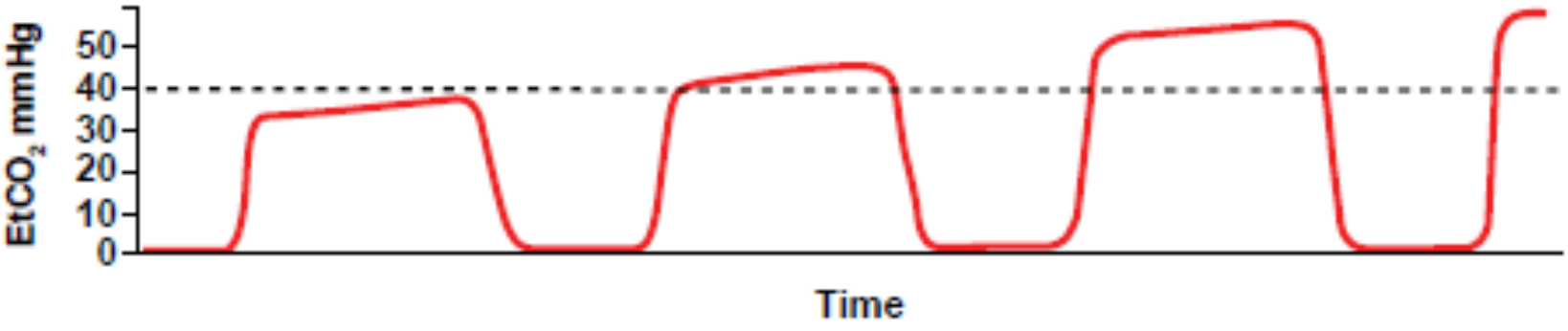


Figure 8: Capnogram illustrating hypoventilation.

- Decreased Respiratory Rate
- Increased ETCO2
- Increased waveform amplitude and width

Apnea

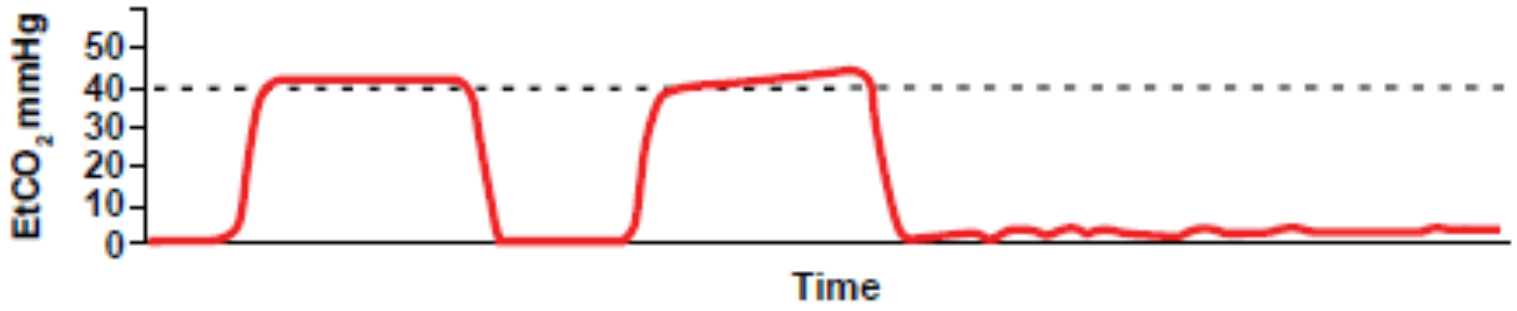
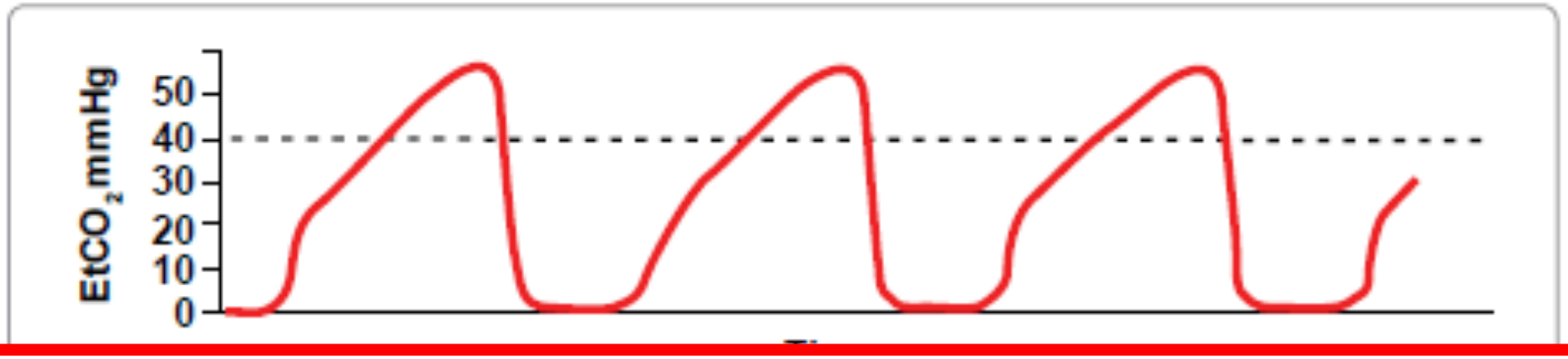


Figure 12: Capnogram illustrating the sudden disappearance of the wave form indicating apnea.

- Unplugged or misplaced?
- Cardiac Arrest?
- Overdose?

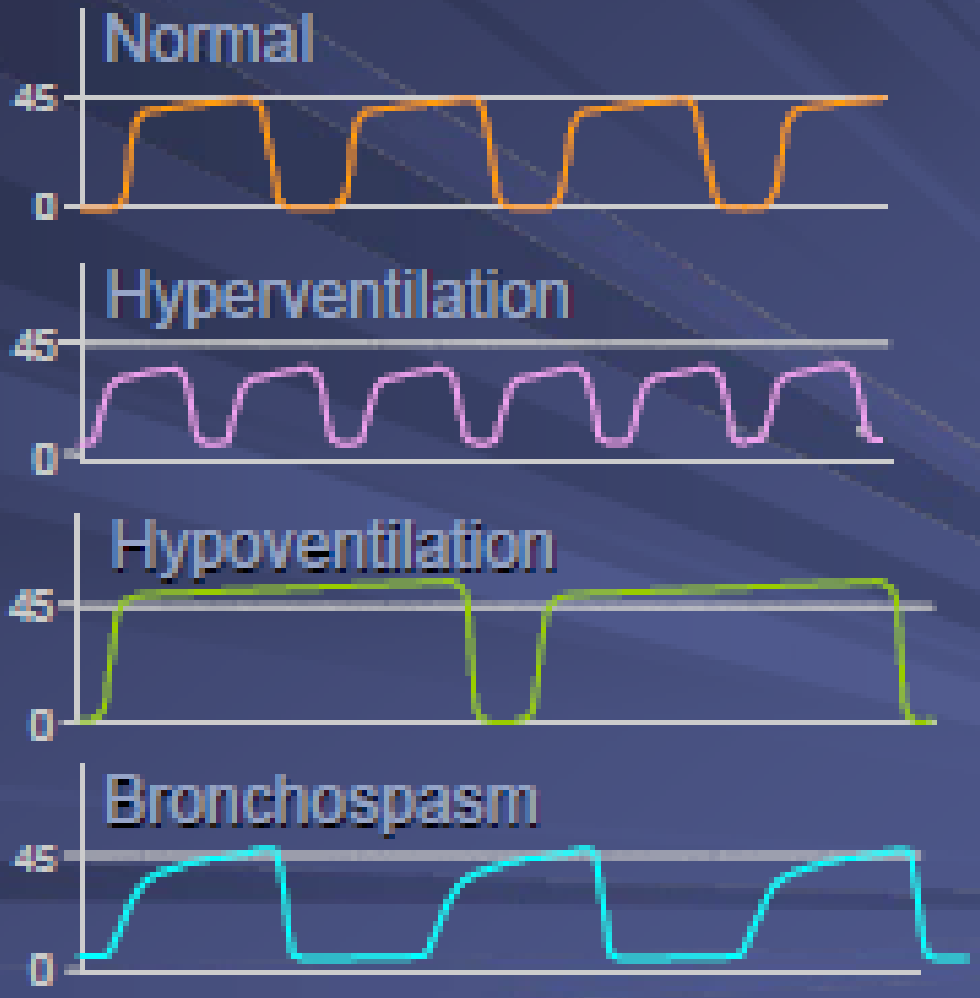
Bronchospasm



ETCO2 <28 or >50 Associated with Worse Outcome

- Shark Fin = Prolonged expiration
- High End Tidal Reading = Air trapping
  - Asthma
  - COPD
  - Anaphylaxis

Capnography Waveform Patterns

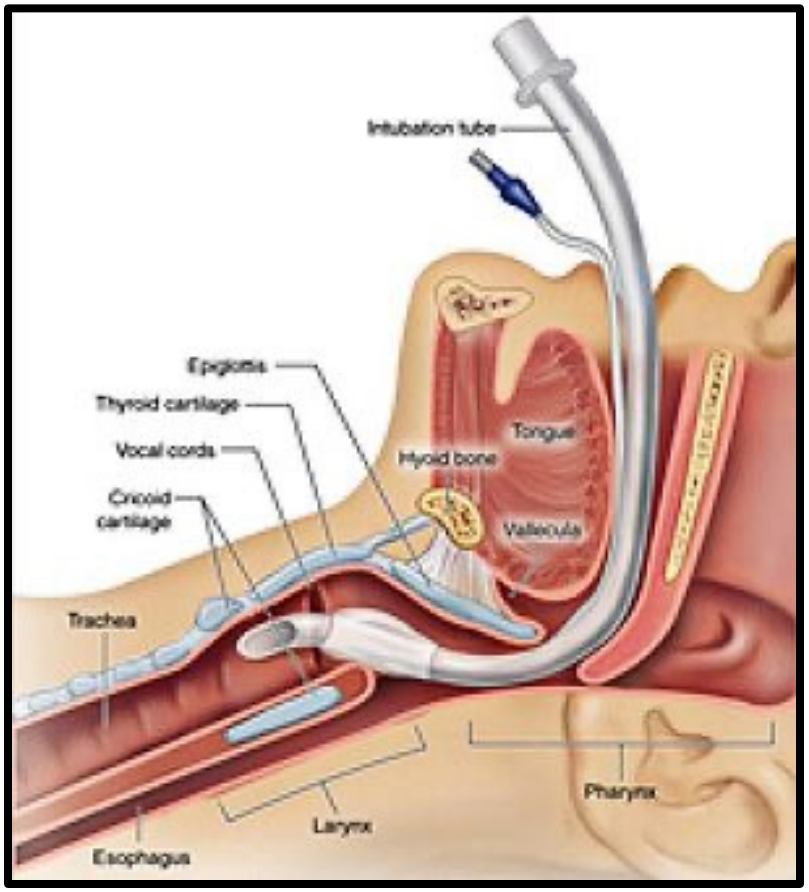



SO
WHAT?


TH1RTEEN R3ASONS
WHY

Gold Standard For Intubation

Correct Placement?



Apnea

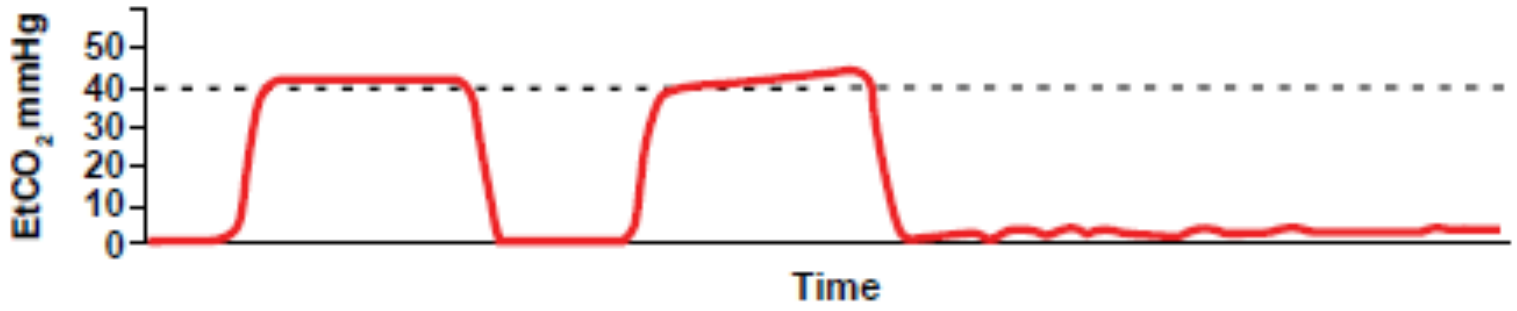
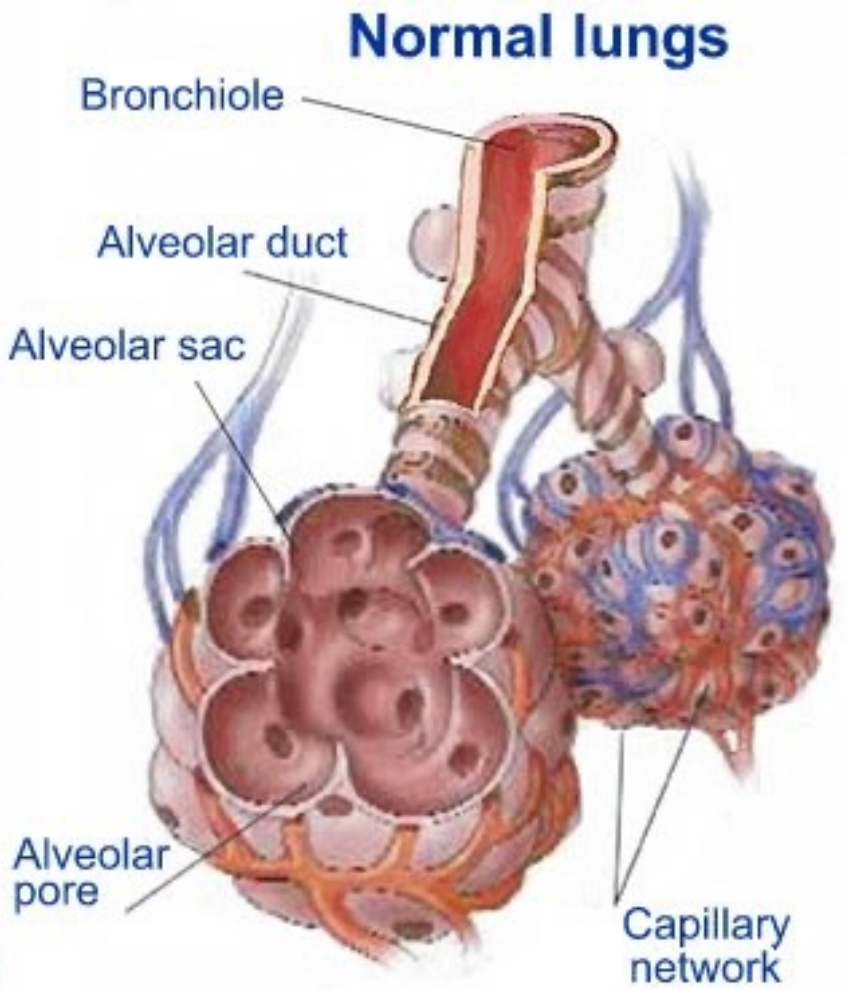


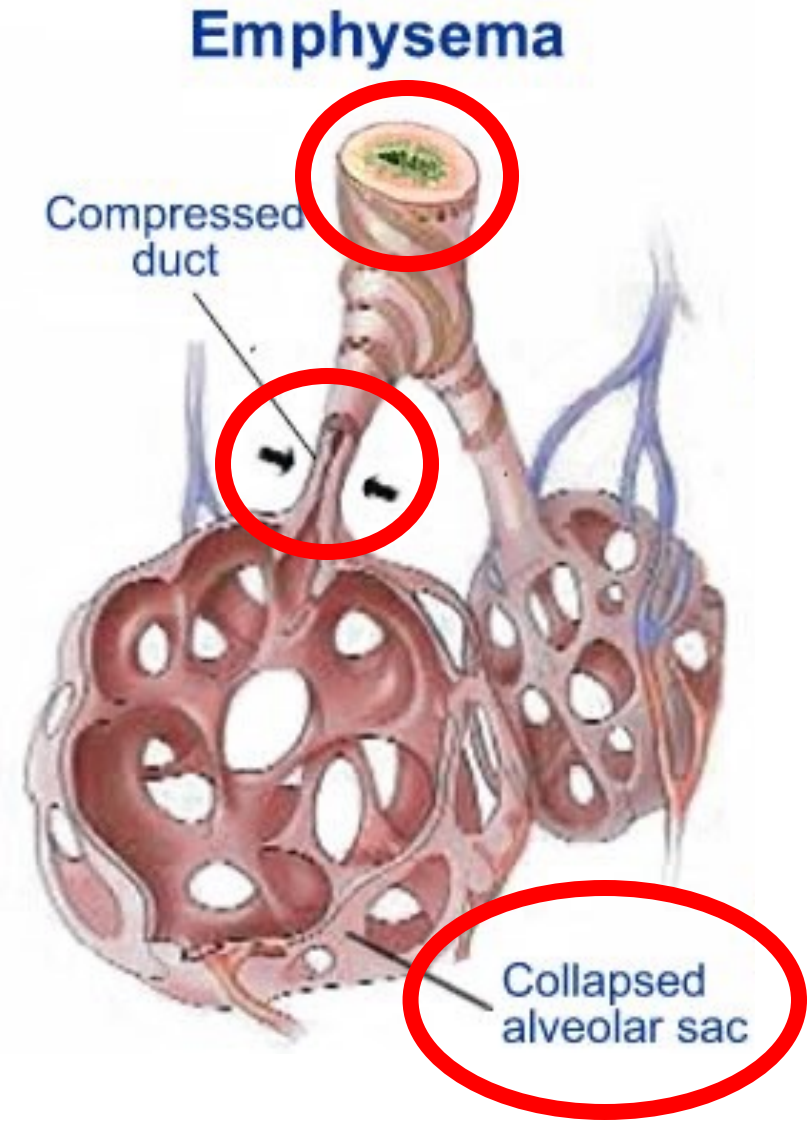
Figure 12: Capnogram illustrating the sudden disappearance of the wave form indicating apnea.

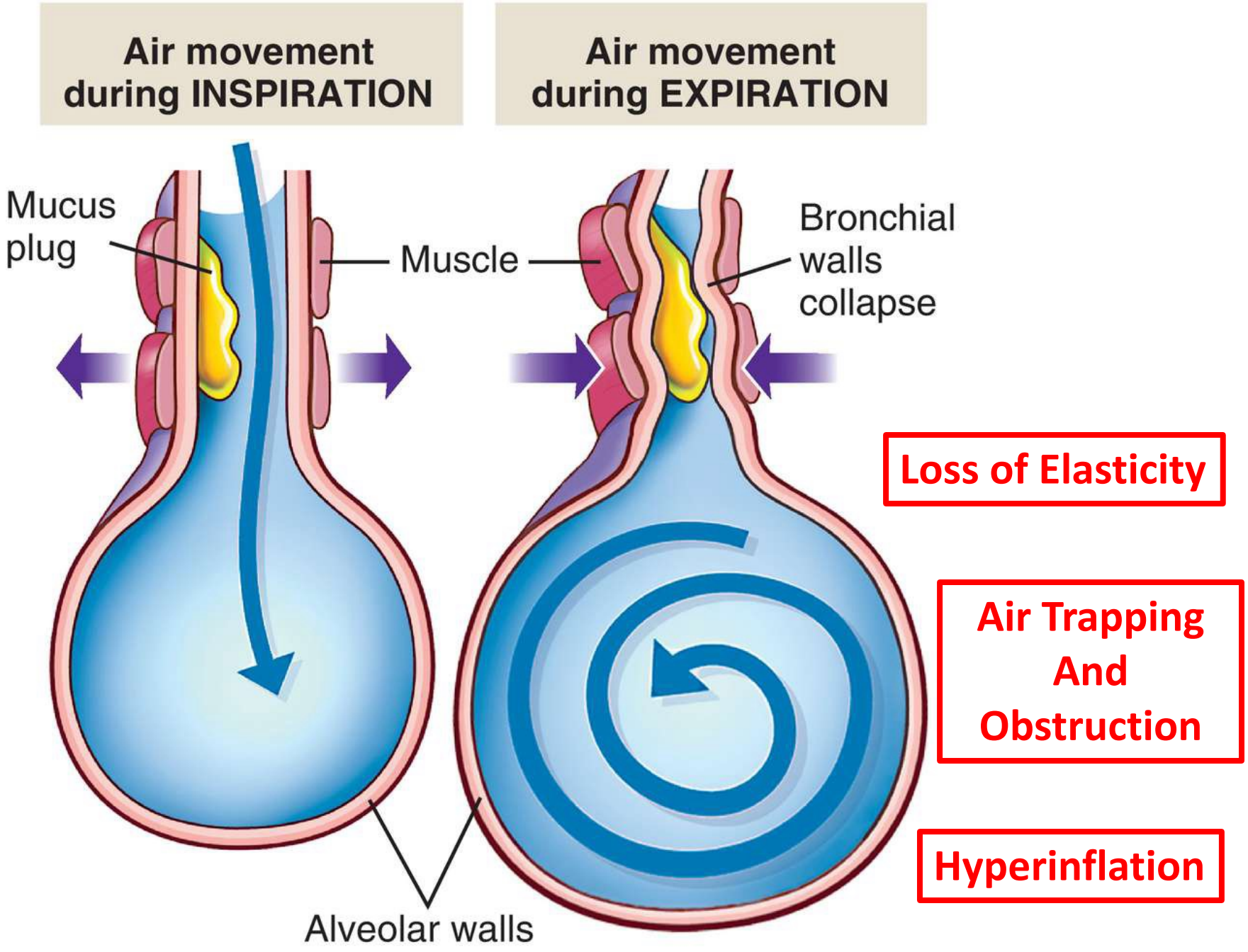
- Unplugged or misplaced?
- Cardiac Arrest?

Adequate Bagging?

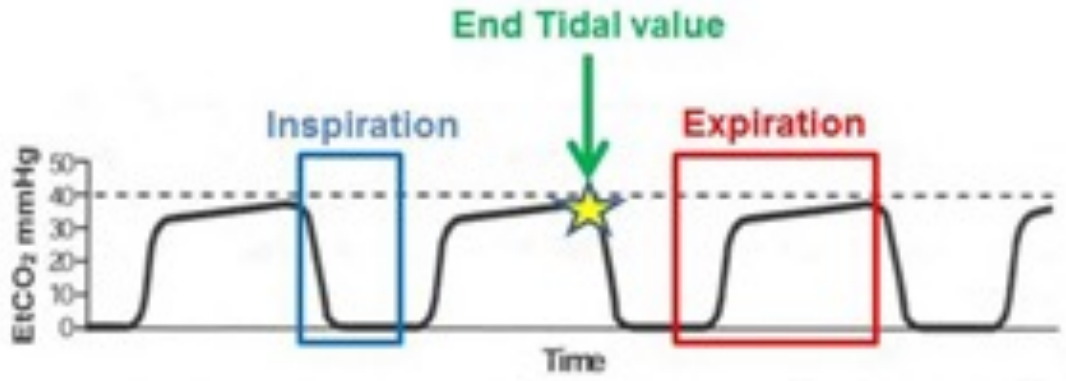
COPD and Emphysema

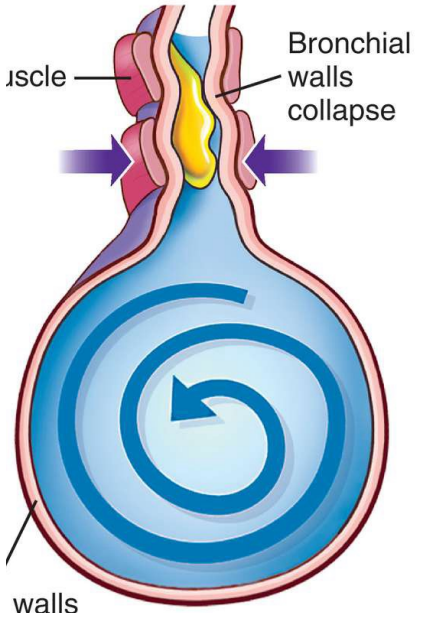


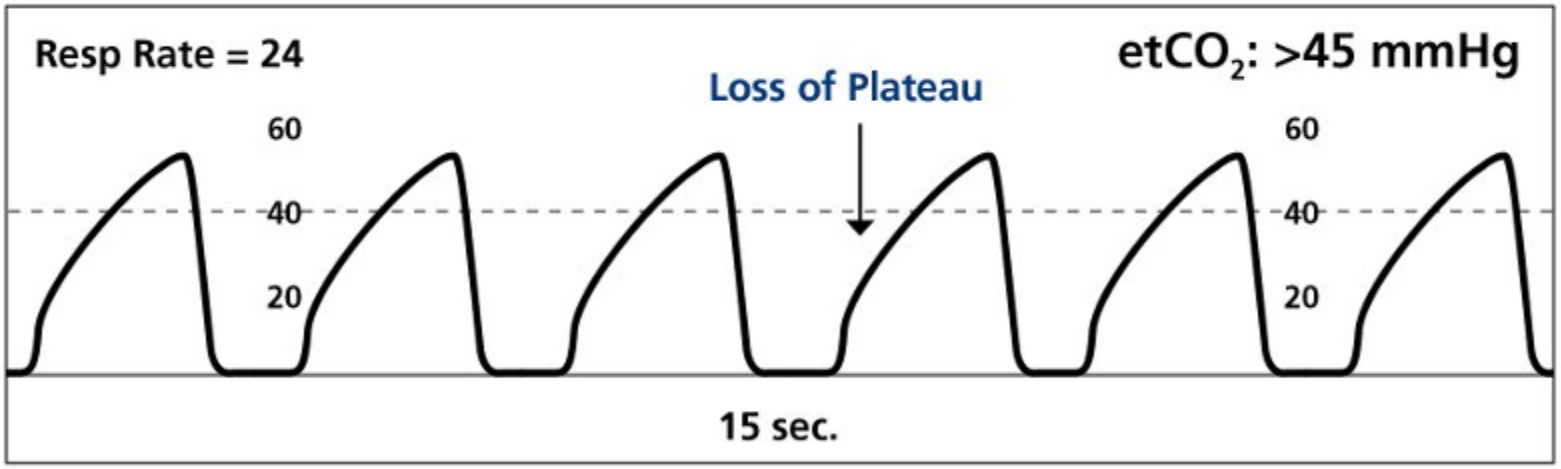



Air movement during INSPIRATION
Air movement during EXPIRATION
Mucus plug
Muscle
Bronchial walls collapse
Alveolar walls
Loss of Elasticity
Air Trapping And Obstruction
Hyperinflation

Capnography

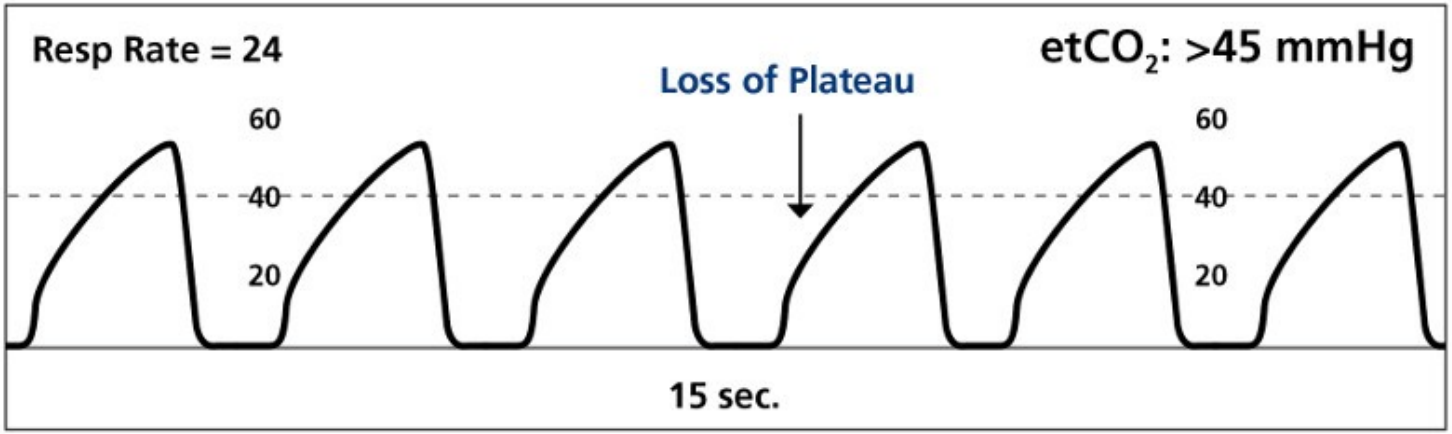




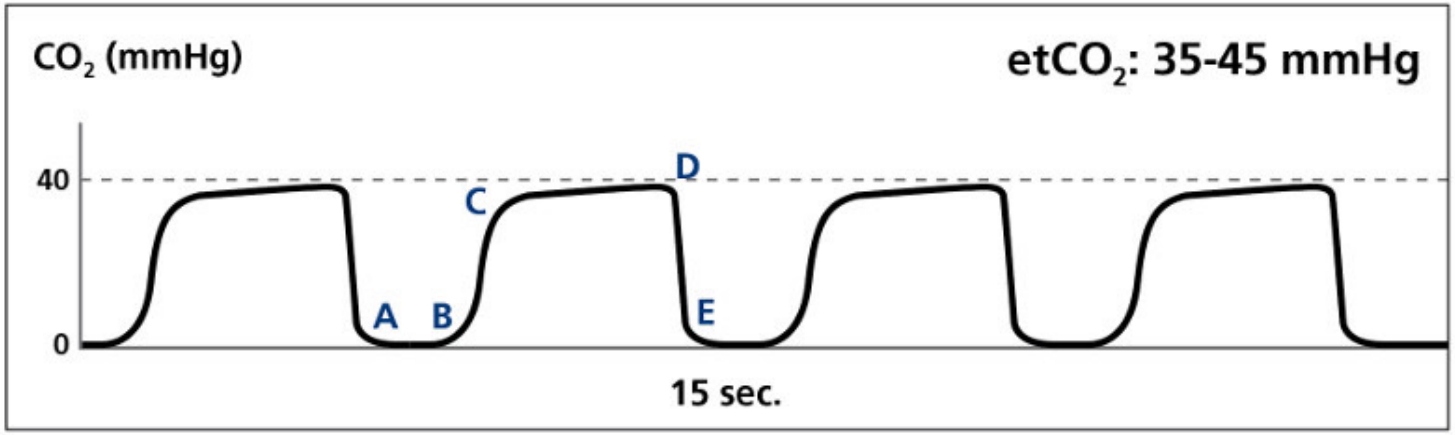


Waveform Capnography

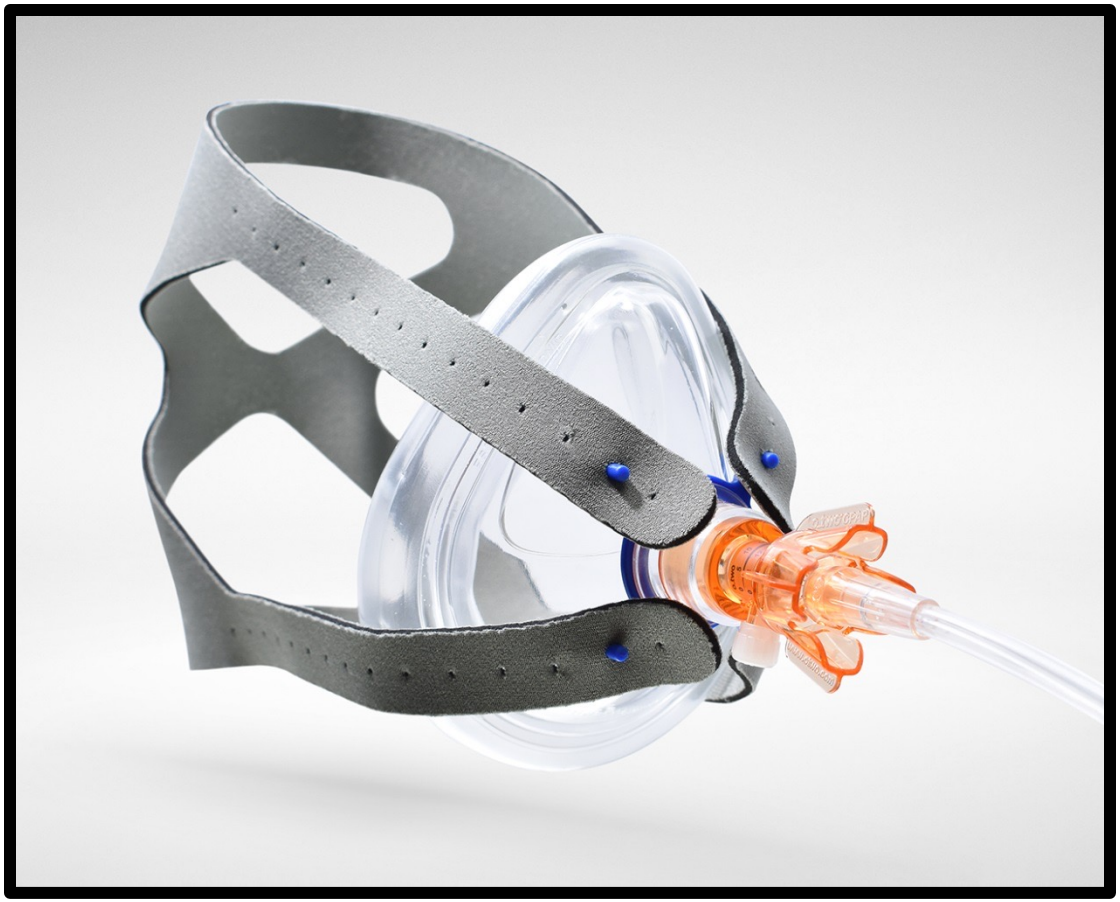
COPD

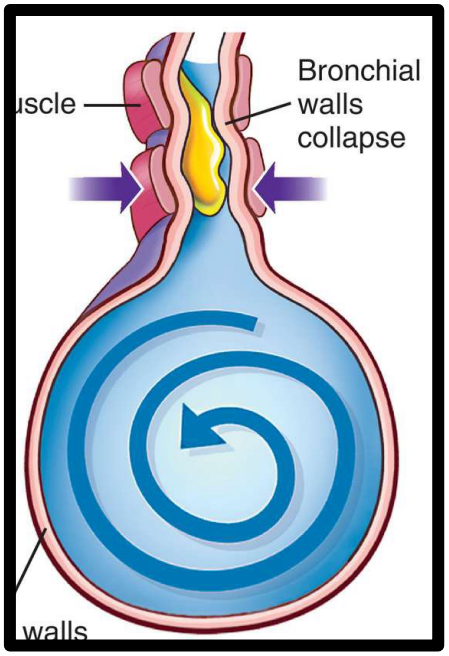


CHF



Treatments – Positive Pressure





Overdose?

Hypoventilation

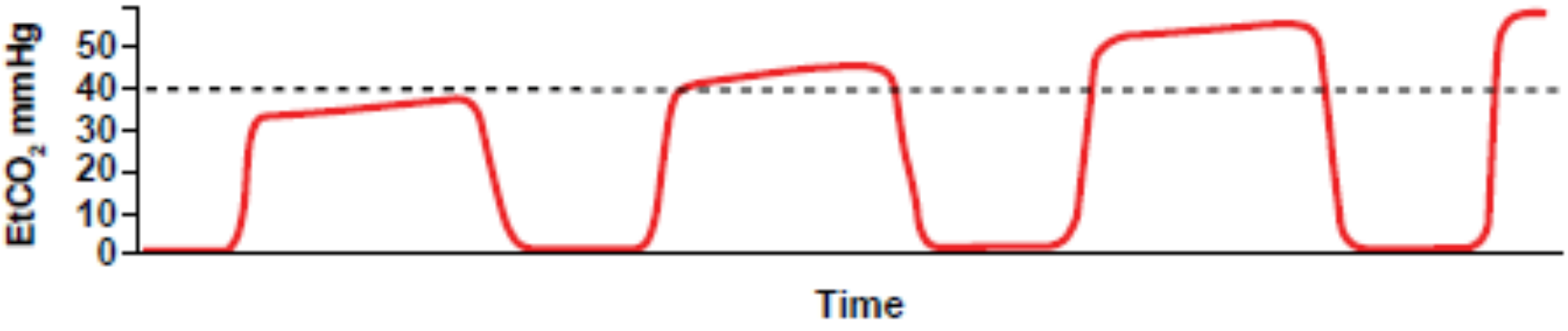
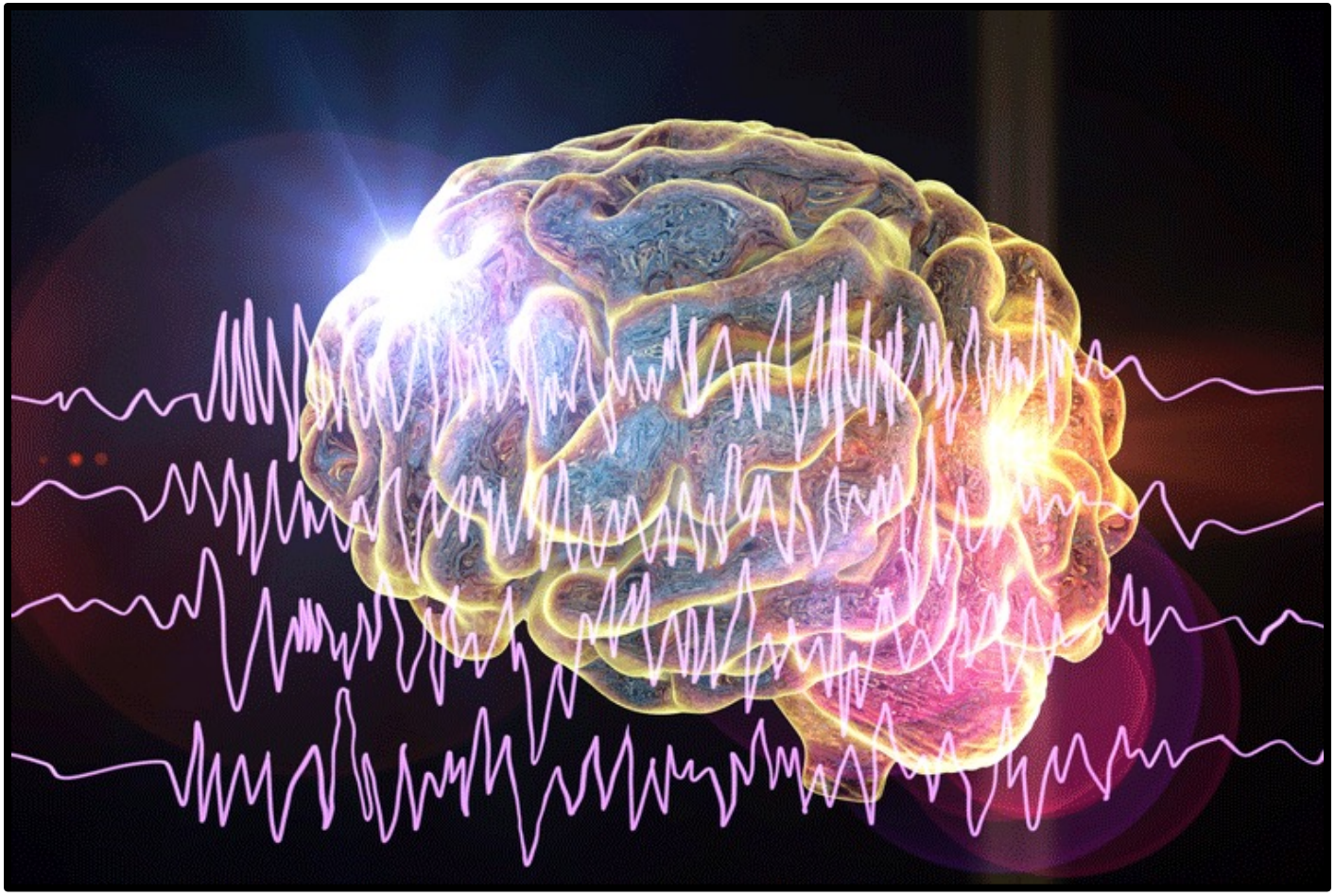


Figure 8: Capnogram illustrating hypoventilation.

- Decreased Respiratory Rate
- Increased ETCO2
- Increased waveform amplitude and width

Seizure



Hypoventilation

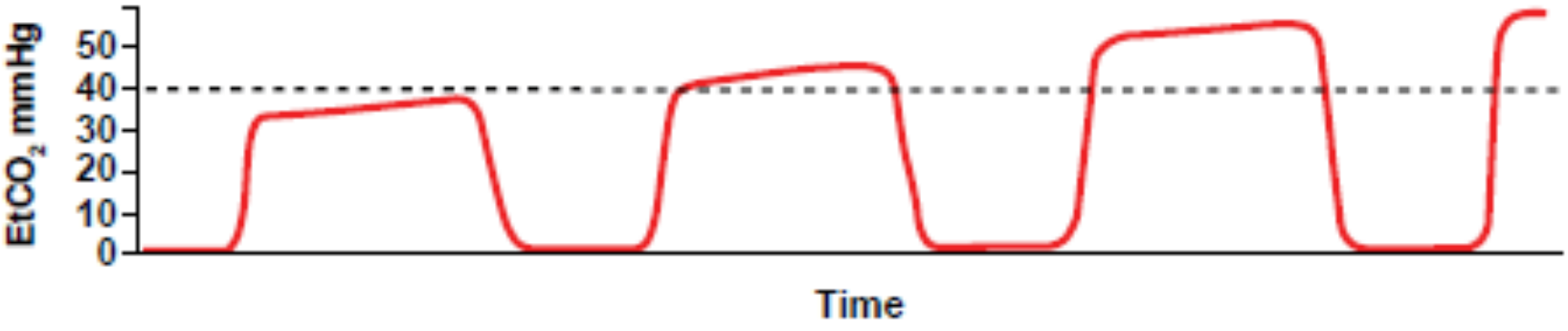


Figure 8: Capnogram illustrating hypoventilation.

- Decreased Respiratory Rate
- Increased ETCO2
- Increased waveform amplitude and width

Chemical Restraint or Pain Meds

Capnography Detects Respiratory Depression 60 Seconds Faster Than Pulse Ox

Hypoventilation

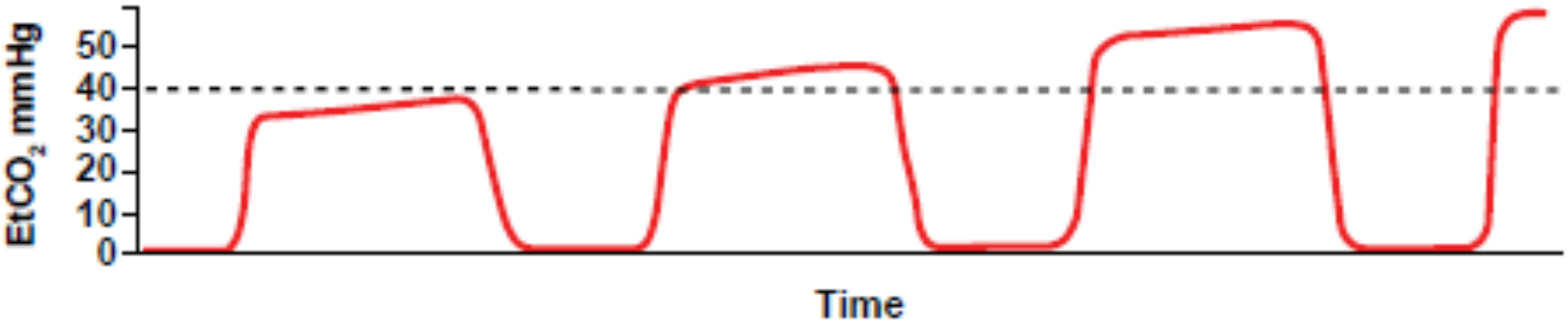


Figure 8: Capnogram illustrating hypoventilation.

- Decreased Respiratory Rate
- Increased ETCO2
- Increased waveform amplitude and width

Hypothermia

Hypoventilation

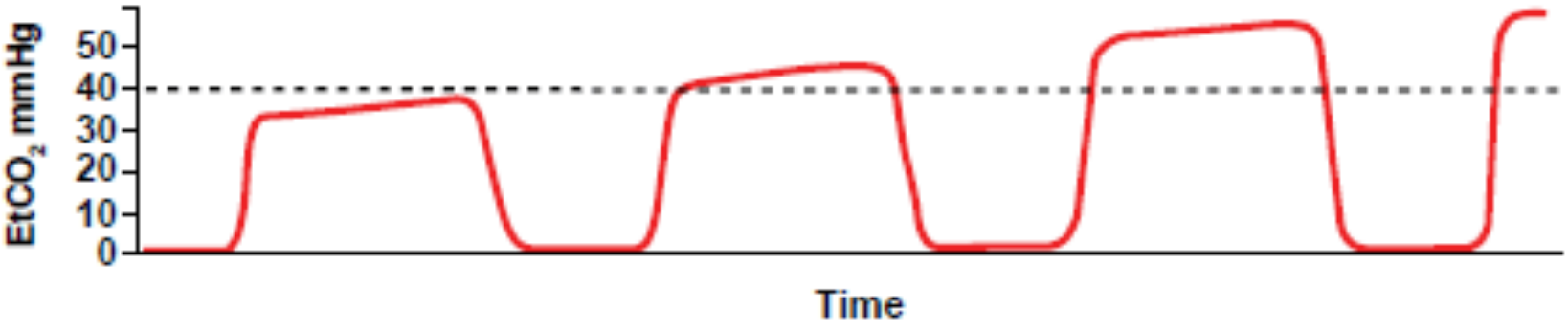
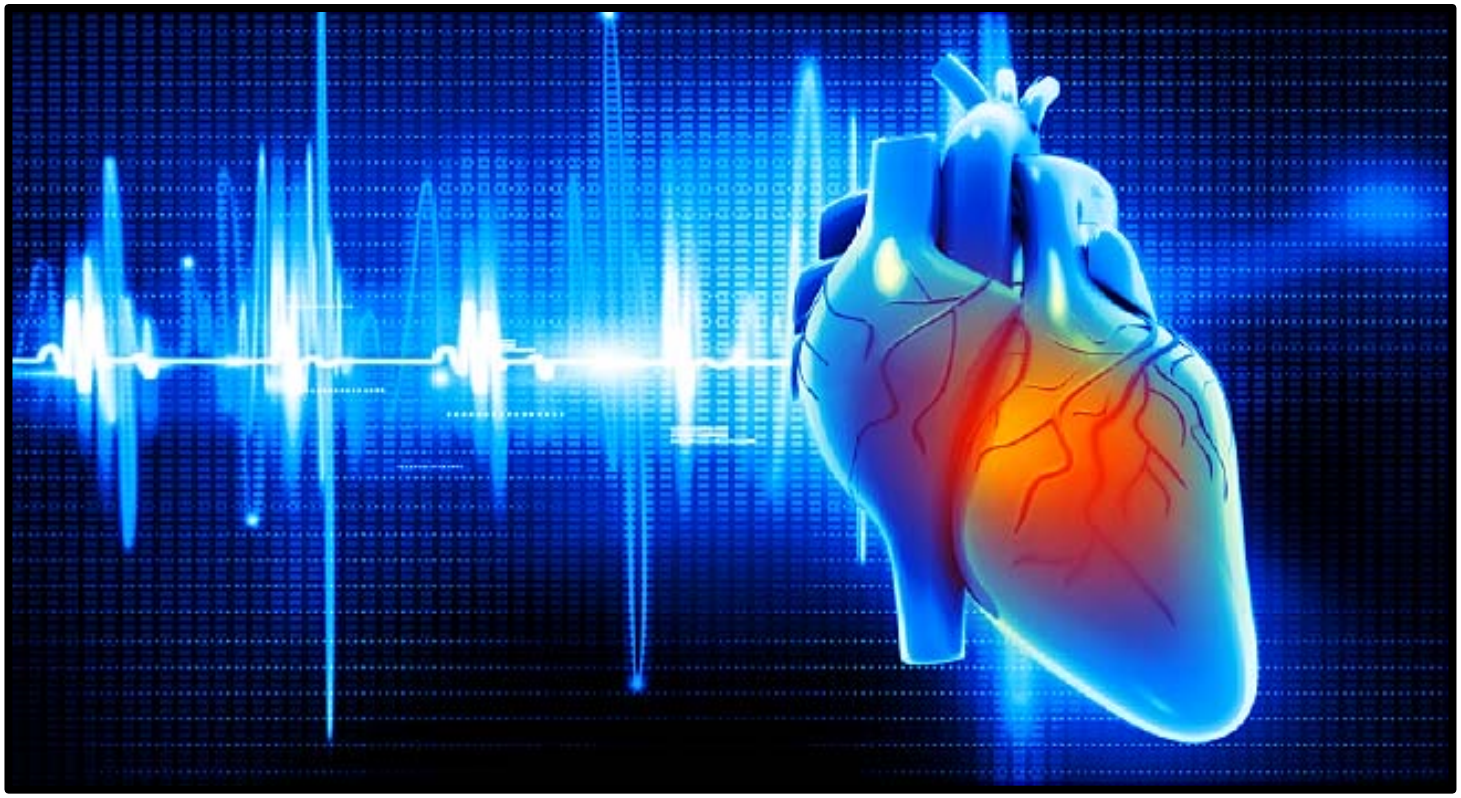


Figure 8: Capnogram illustrating hypoventilation.

- Decreased Respiratory Rate
- Decreased metabolic rate
- Increased ETCO2
- Increased waveform amplitude and width

Cardiac Arrest



Sudden Increase in ETCO2 Could Suggest ROSC or Great CPR

DKA

Cellular Metabolism

$C_6H_{12}O_6$ + 6 (O_2) → 6 (CO_2) + 6 (H_2O) + ATP

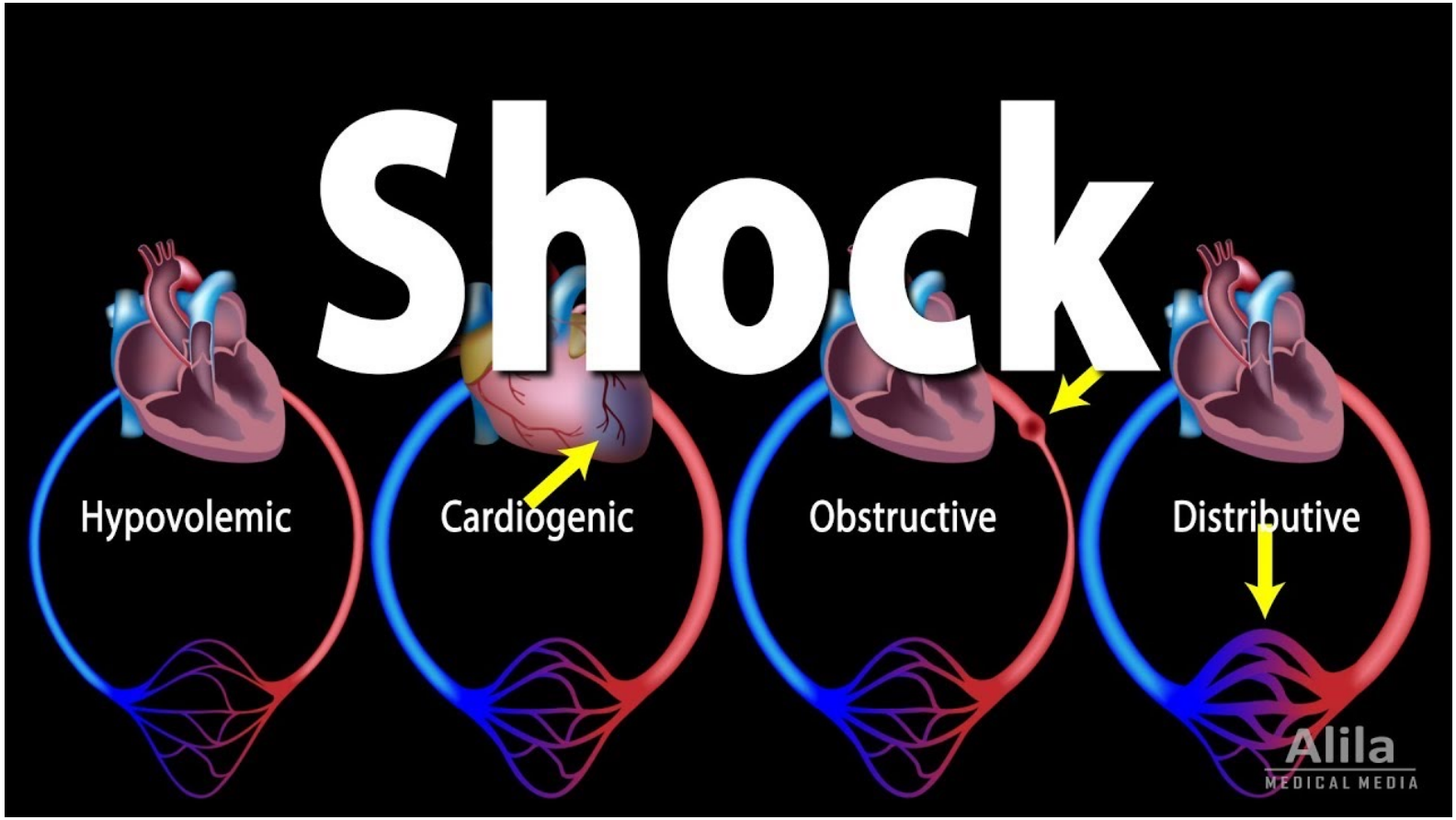
Oxygen

Carbon Dioxide

Water

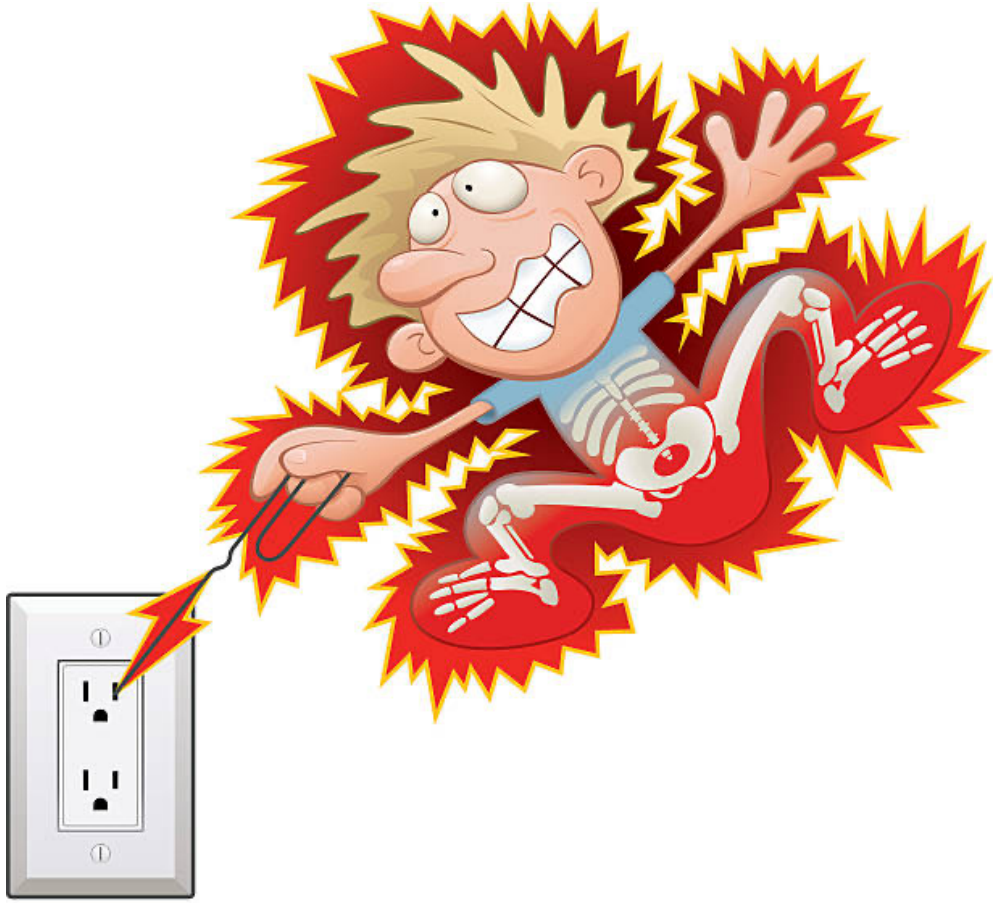
Energy

Sugar Can't Get Into the Cell


Shock
Hypovolemic
Cardiogenic
Obstructive
Distributive
Alila
MEDICAL MEDIA

Sepsis / Shock

Shock = Inadequate Tissue Perfusion



- Less Metabolism Is occurring because less blood is being delivered to tissues
- Low End Tidal

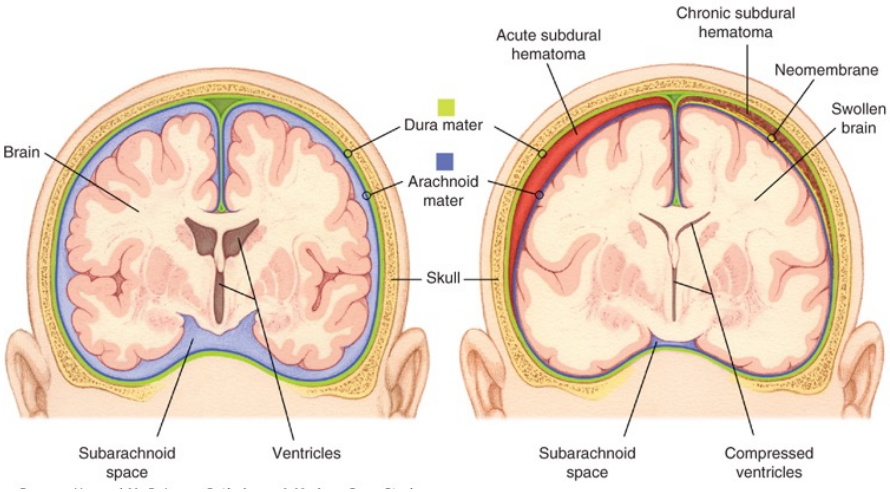
Bleeding and Trauma

Hemorrhagic Shock?

Head Trauma

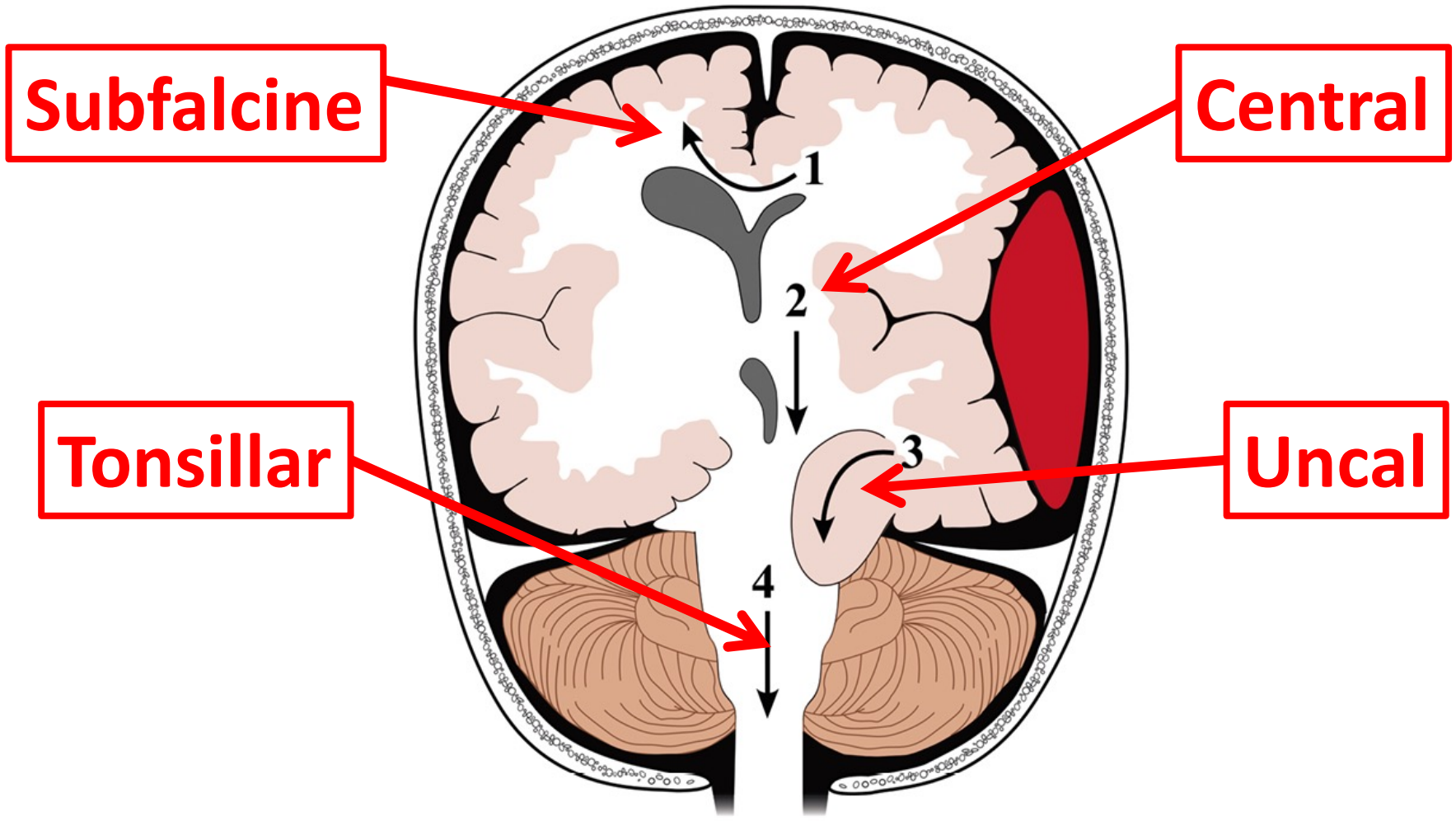
Cushing's Triad = Increased ICP

- Increased BP and tachycardia
  - Attempt to restore blood flow to ischemic brain
- Decreased HR
  - Vagal nerve stimulation
- Irregular breathing
  - Brainstem involvement



Vital Signs Are Vital!

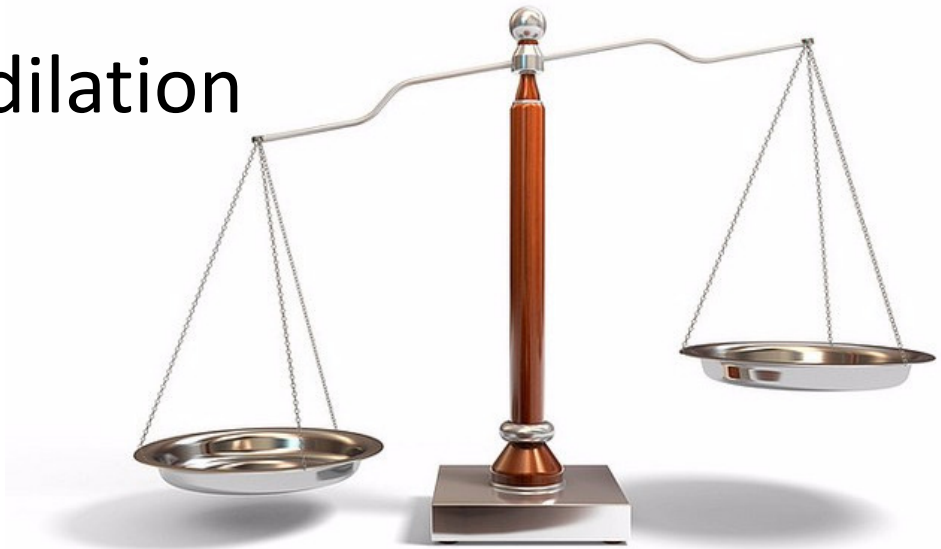
Herniation



Stroke

Carbon Dioxide And Autoregulation

- Decreased CO_2 = vasoconstriction
  - Hyperventilation reduces CO_2
  - Decreased ICP but also decrease blood flow
  - Worsens ischemia
- Increased CO_2 = vasodilation
  - Can worsen ICP



Capnography??

End Tidal Goal is 35-40

Questions?