

سُبْحَانَكَ اللَّهُمَّ
وَبِحَمْدِكَ



Oxygen therapy

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Definitions:



Hypoxia

- Lack of o_2 availability in tissues

Hypoxemia

- Relative deficiency of o_2 in blood
- Arterial $\text{Po}_2 < 80$ mmhg

Dysoxia

- Lack of o_2 utilization by tissues

Asphyxia vs Hypoxia

- Asphyxia and hypoxia are two related conditions that occur due to the inadequate supply of oxygen to the cells and tissues. Asphyxia is defined as a medical condition where the body does not receive enough oxygen due to abnormal breathing. On the other hand, hypoxia is a medical condition where the body tissues and organs are not supplied with an adequate level of oxygen to sustain normal bodily functions due to an underlying illness. So, this is the key difference between asphyxia and hypoxia



Anoxia

an absence or deficiency of
oxygen reaching the tissues;
severe hypoxia.

"death due to anoxia resulting
from strangulation"



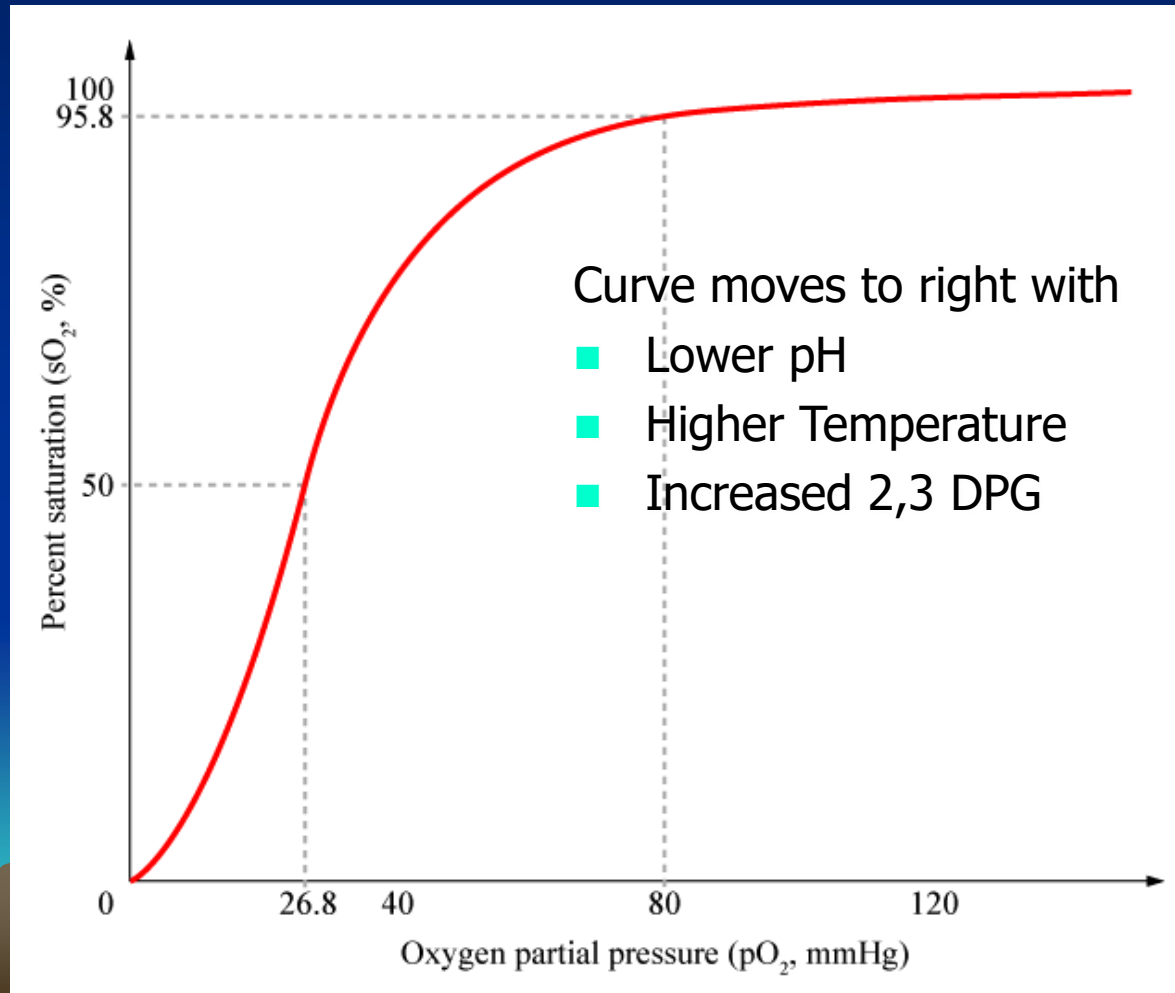
- Oxygen therapy is the administration of oxygen at concentrations greater than ambient air(21%)
With the intent of treating or preventing the symptoms and manifestations of hypoxia(a deficiency of oxygen reaching the tissues of the body)



- FiO_2 = Fraction of inspired oxygen, or the percent of oxygen in the inspired gas
- Oxygen toxicity is cellular injury of the lung parenchyma and airway epithelium due to release of cytotoxic free oxygen radicals.
- There is no exact threshold at which O_2 toxicity occurs, however signs of gas exchange abnormalities occur within 24-48 hours if on 100% oxygen. Atelectasis leading to drop in PO_2 , decreased lung compliance, infiltrates on x-ray.
- Breathing FiO_2 up to .5 for 2-7 days usually does NOT result in toxicity.



Given a PaO_2 , what is the SaO_2 (and vice-versa)



Respiration

The process of gas exchange;
specifically at the alveolar and
cellular level.

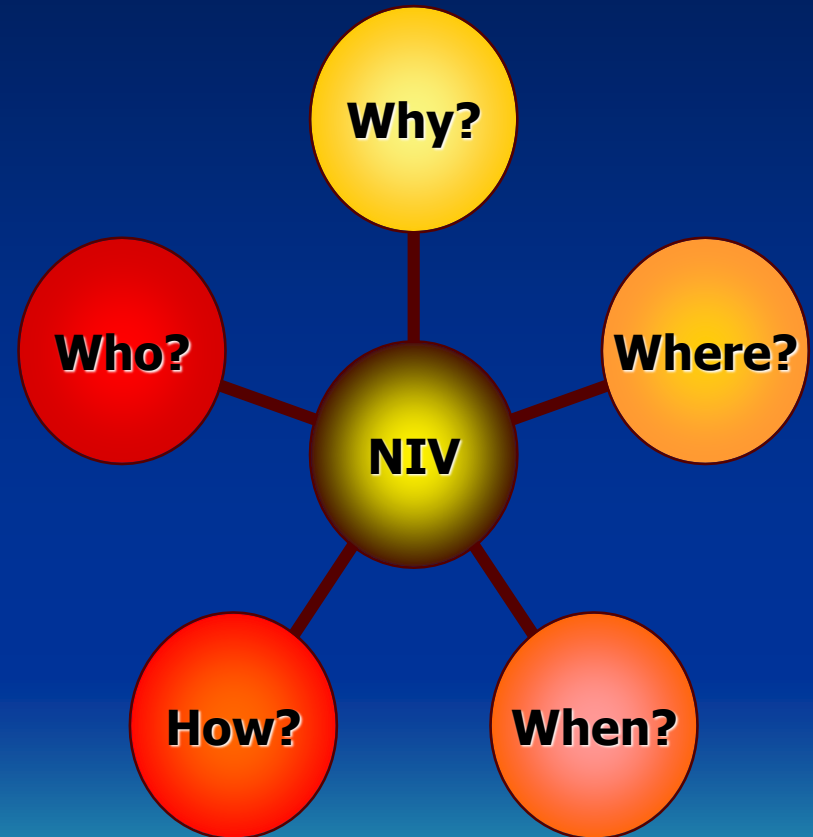


Ventilation

The process of inspiration and expiration. Inspiration is an active process and expiration is a passive process.



Setting up an acute non-invasive ventilation service



OXYGEN THERAPY

- Aims to improve PaO_2 by increasing FiO_2
- Effective FiO_2 - 0.24 - 0.50
- $\text{FiO}_2 > 0.50$ not indicated

Indications for Oxygen Administration

- Any patient:
- with difficulty breathing or who is cyanotic or has (partially) obstructed airway
- suffering stroke, head injury, heart attack, or cardiac arrest
- who is unresponsive or in shock
- with spinal injuries
- with chest injuries other than bruised ribs



O2 Administration cont...

- with suspected internal hemorrhage
- with open fractures, or closed fractures with possible internal hemorrhage
- with multiple injuries
- with moderate to severe burns, especially facial burns with possible affected airway
- with anemia or carbon monoxide poisoning
- Essentially any disease, injury, or environmental condition resulting in the amount of oxygen reaching the cells (perfusion) being inadequate.



Types of Hypoxia

1-Hypoxic Hypoxia

2-Circulatory Hypoxia

3-Hemic Hypoxia

4-Demand Hypoxia

5-Histotoxic Hypoxia



Hypoxic Hypoxia

- *Low PaO₂(arterial oxygen tension) secondary to FiO₂<.21 or decreased barometric pressure(altitude)
- *Impaired ventilation secondary to neuromuscular weakness or narcotic overdose
- *Impaired oxygenation secondary to Pulmonary Fibrosis, ARDS



Circulatory Hypoxia

- *Inadequate pumping of the blood from the heart to tissues , maybe secondary to disorders causing decreased cardiac output such as MI, low fluid volume, hypotension, poor supply of arteries. If the patient has myocardial ischemia supplemental O₂ is definitely indicated.



Hemic Hypoxia

- Decreased oxygen carrying capacity as in anemia or carbon monoxide poisoning



Demand Hypoxia

- Increased tissue consumption of oxygen in hypermetabolic states: like fevers



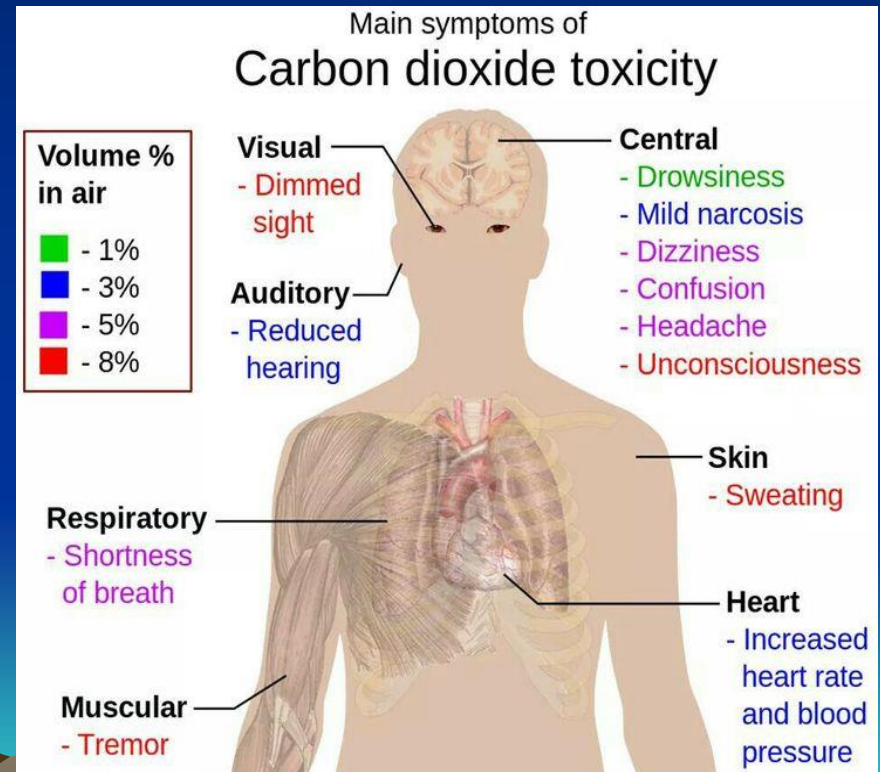
Histotoxic Hypoxia

- Utilization of oxygen is abnormal such as in cyanide poisoning



O2 therapy for **Non-Hypoxic** conditions

- Indicated in carbon monoxide poisoning where the carbon monoxide has combined with the haemoglobin to form carboxyhaemoglobin



Signs and Symptoms of Hypoxia

- Tachypnea, dyspnea, hyperpnea,
- Tachycardia, dysrhythmias, pulse change, hypertension
- Anemia, polycythemia
- Restlessness, disorientation, lethargy,
- Cyanosis, digital clubbing



Delivery systems



Methods of o2 administration:

Method	maximum
	achievable fio2(at 6-10 L/M of o2)
• Nasopharyngeal catheter	50%
• Nasal prongs	50%
• Masks:	
• Without reservoir bag	50%
• With reservoir bag(partial rebreathing)	70%
• With reservoir bag(non rebreathing)	95%
• Venturi	24,28,35,40%
• Incubator	40%
• Canopy tent	50%
• Head box	95%
• Mouth to mouth(outside air)	16%

The non rebreather mask

- This mask provides the highest concentration of
- **oxygen (95-100%)** at a flow rate 6-15 L/min.
- It is similar to the partial rebreather mask
- except two one-way valves prevent conservation of exhaled air.
- The bag is an **oxygen** reservoir

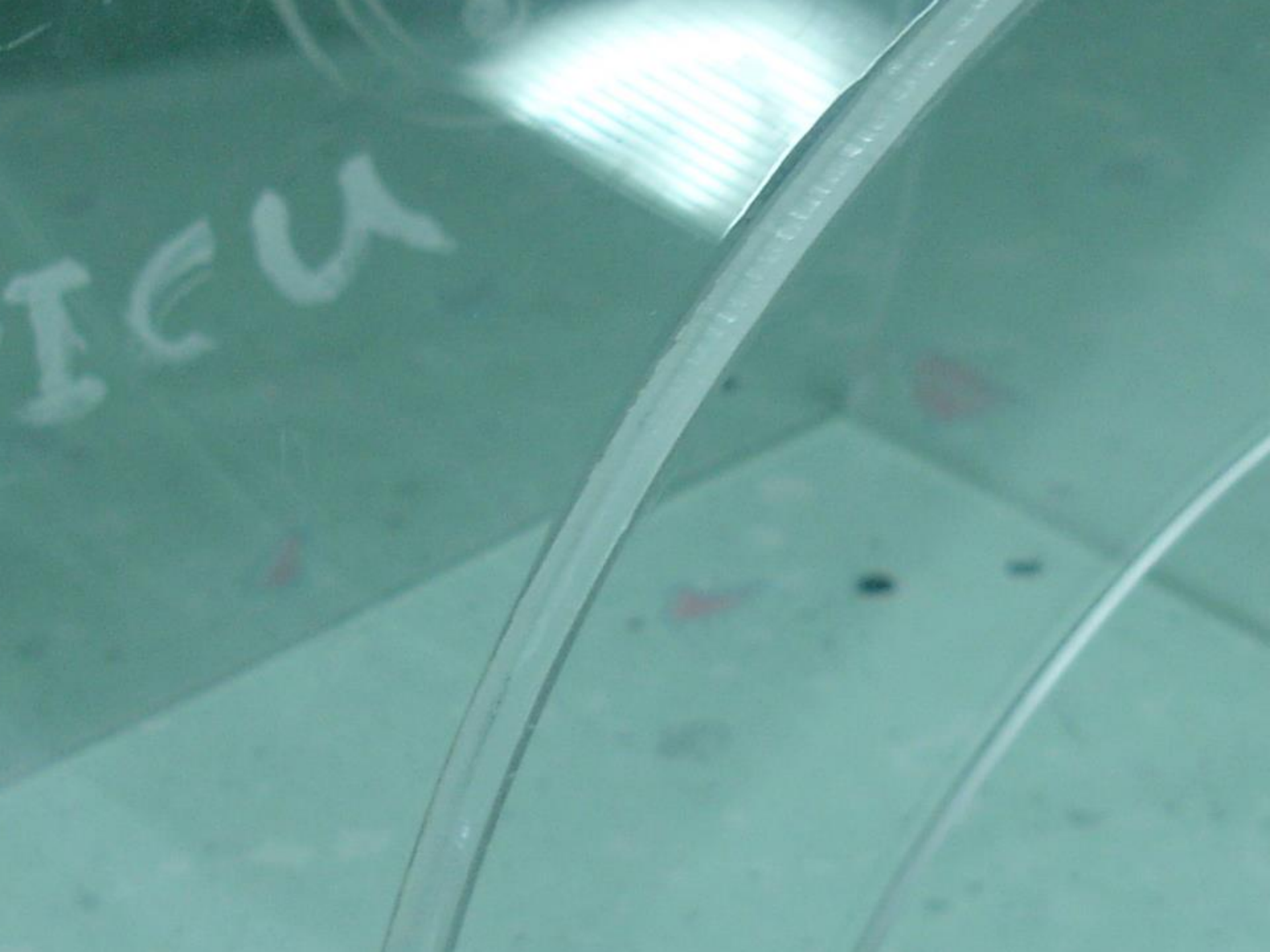


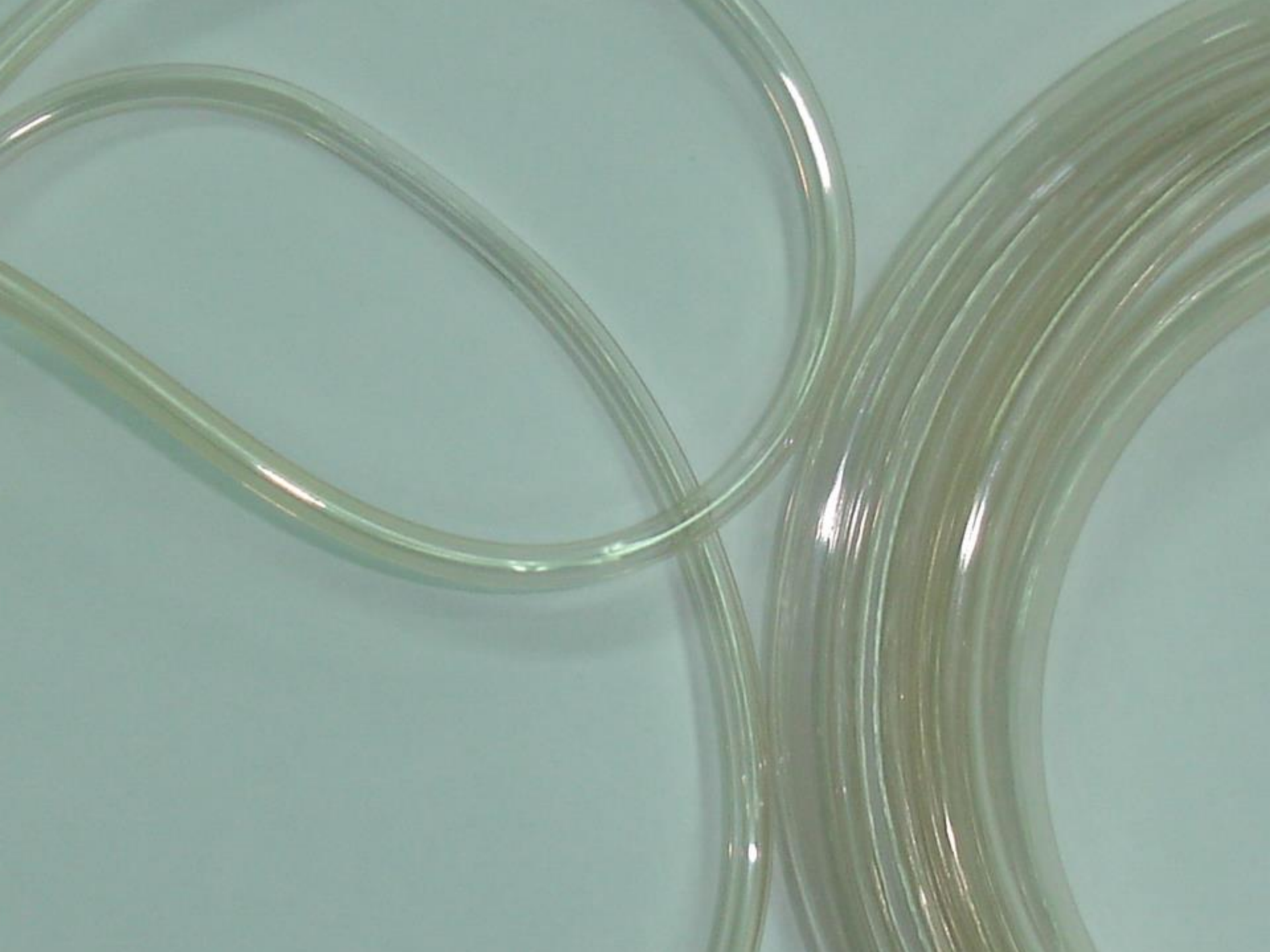






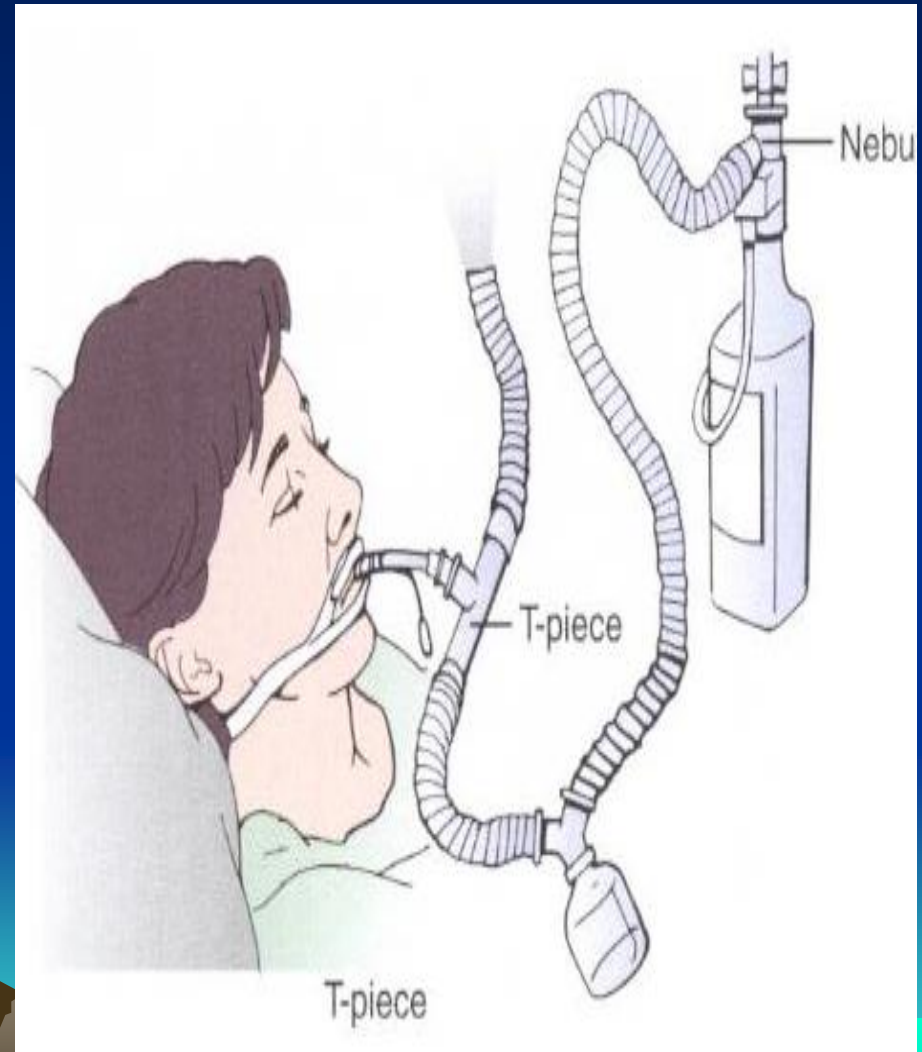






T-piece

- Used on end of ET tube when weaning from ventilator
- Provides accurate **FIO₂**
- Provides good humidity



Mechanical Ventilation



INDICATION

Acute hypoxemic respiratory
failure

Acute hypercapnic respiratory
failure



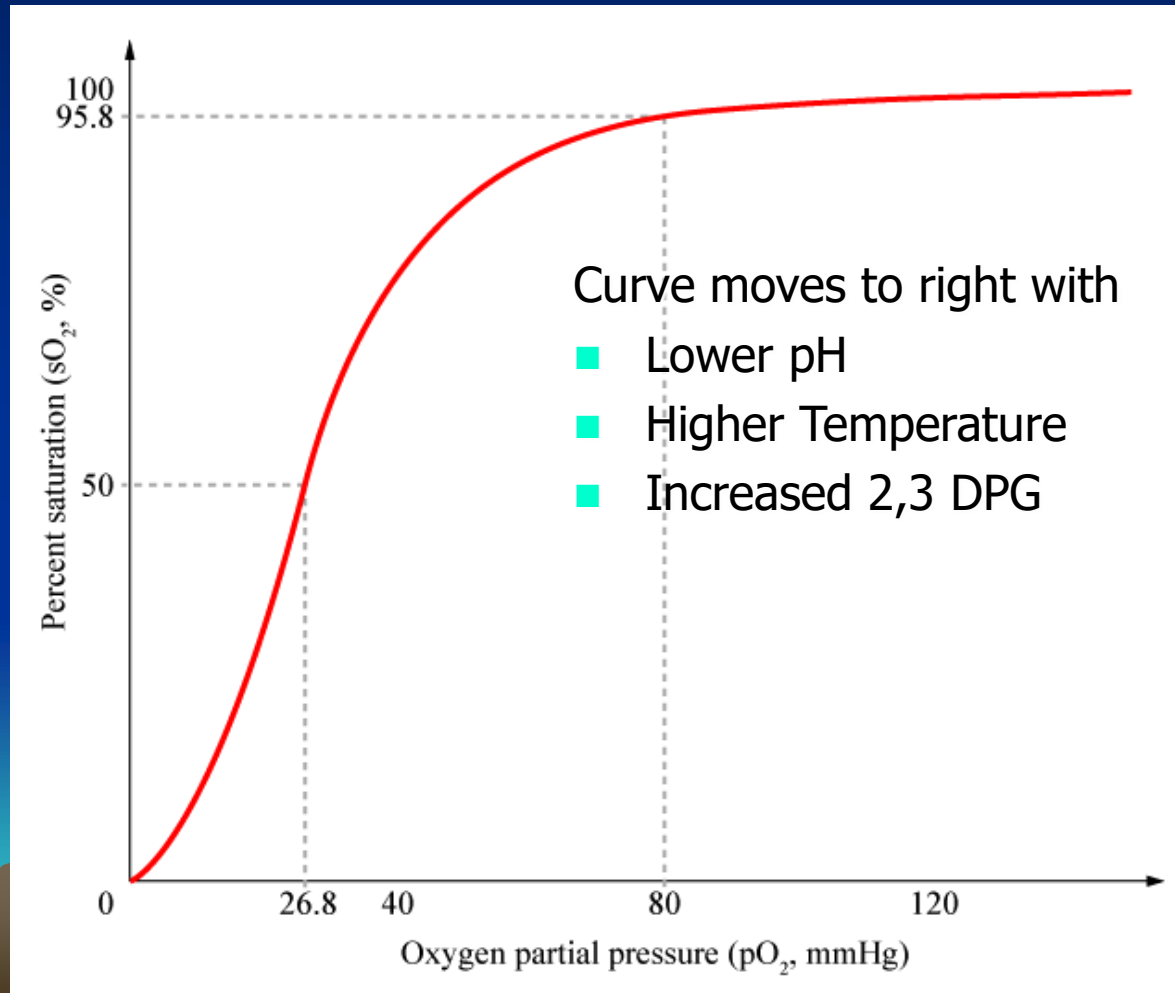
Definiton:

Pao₂ less than 60% while fio₂ is
more than 60%

Paco₂ is more than 50%



Given a PaO_2 , what is the SaO_2 (and vice-versa)



Thank you for your attention
any comment?

