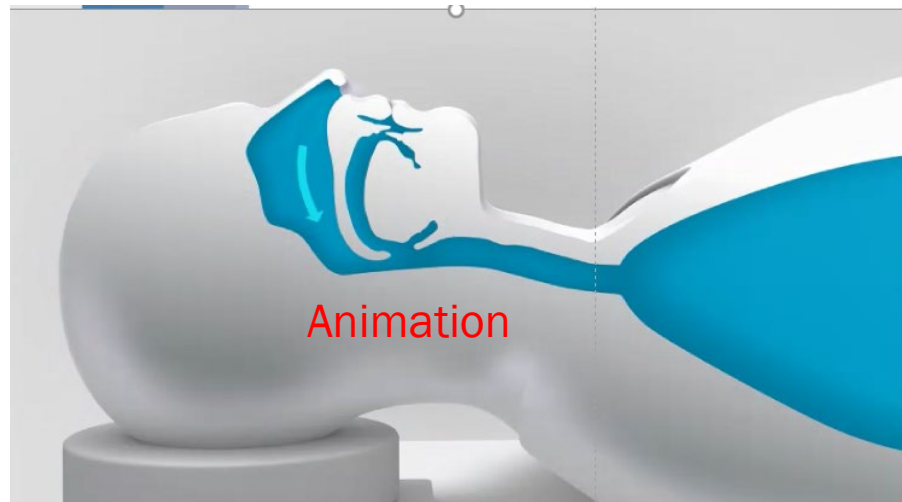


# Pneuma Therapeutics

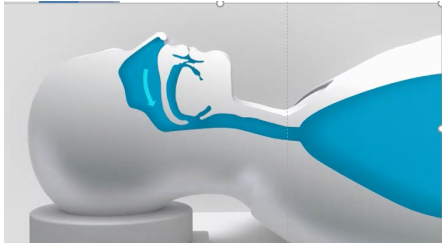
# The Problem

- ▶ Loss of pharyngeal muscle tone during anesthesia and sleep predisposes to Upper Airway Obstruction (UAO)
  - ▶ Respiratory Compromise (RC) due to anesthesia
  - ▶ Obstructive Sleep Apnea (OSA)
- ▶ Potential result from either RC or OSA:
  - ▶ Hypoxemia, oxygen desaturation, hypoxia, hypercapnia, respiratory acidosis



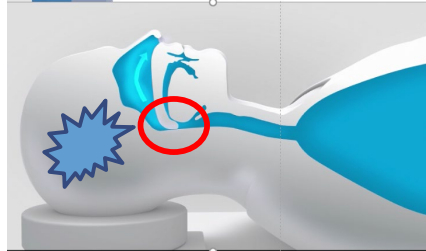
# Animation Sequence

1



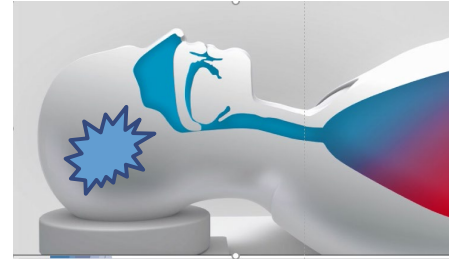
Normal breathing

2



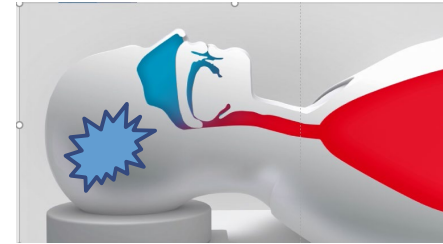
Reduced level of consciousness results in relaxed laryngeal muscles, allowing the tongue to obstruct upper airway

3



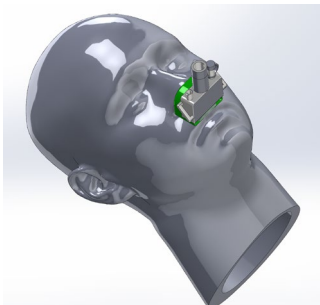
Airflow into the lung ceases and oxygenation & ventilation are impaired

4



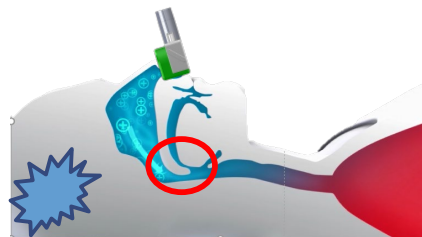
Blood oxygen levels drop drastically and CO2 levels increase

5



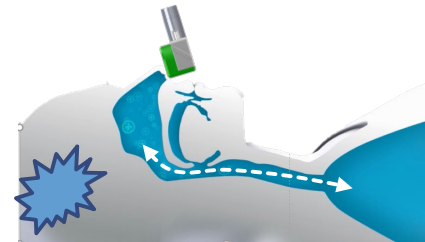
Nasal Positive Pressure oxygenation & ventilation addresses problem

6



Application of nasal positive pressure relieves the obstruction in the larynx, creating a patent airway

7



Restoration of airflow restores normal O2 levels in the blood and normalizes CO2



# The Problem

## Respiratory Compromise from anesthesia

- ▶ Negative outcomes include:
  - ▶ Acute, potentially life-threatening hypoventilation
  - ▶ Serious arterial hypoxemia with inadequate oxygen in blood and vital organs
  - ▶ Hypercarbia and respiratory acidemia (excess  $\text{CO}_2$ )
  - ▶ A major cause of mortality, morbidity, increased length of stay and increased cost
  - ▶ Significant malpractice liability exposure & negative public relations
- ▶ Anesthesia induced upper airway obstruction occurs frequently
  - ▶ General anesthesia, Monitored Anesthesia Care (MAC), regional anesthesia, procedural sedation (radiology, endoscopy, ER procedures), postoperative pain medication

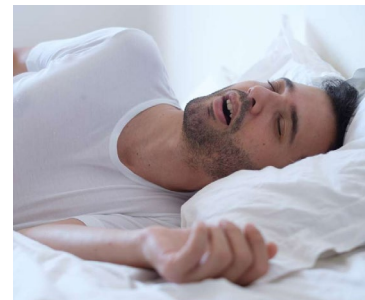


- ▶ Caregivers actively seeking effective, reliable, & cost-effective solutions



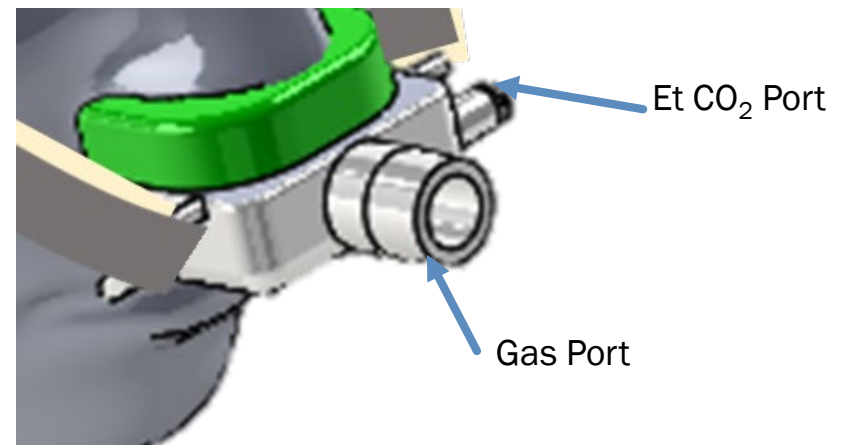
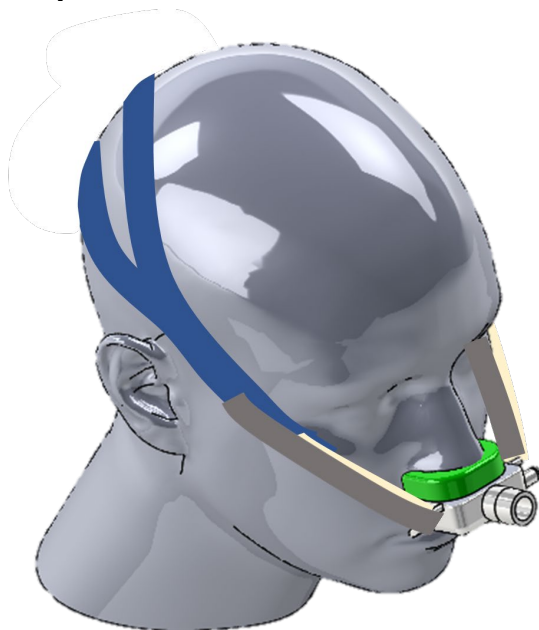
# The Problem: Sleep Apnea

- ▶ Negative outcomes include:
  - ▶ Acute and chronic hypoventilation
    - ▶ Arterial hypoxemia with hemoglobin O2 desaturation
    - ▶ Hypercarbia and respiratory acidemia (excess CO2)
  - ▶ Sleep deprivation
  - ▶ Significant impact on productivity and lifestyle of those afflicted
  - ▶ Major contributor to co-morbidity (Hypertension, heart disease, lung disease)
- ▶ Sleep induced obstruction occurs in large percentage of general population
  - ▶ Frequently but not necessarily associated with obesity
  - ▶ Very low patient CPAP therapy compliance



# Pneuma Xchange™ Solution\* & Features

- ▶ Supports pressurized nasal oxygenation, ventilation & Et CO<sub>2</sub> monitoring
  - ▶ Overcomes upper airway obstruction & maintains a patent airway
    - ▶ Project >69% reduction in respiratory compromise maintaining O<sub>2</sub> saturation<sup>1</sup>
  - ▶ Et CO<sub>2</sub> monitoring verifies ventilation and airway patency in real time<sup>2</sup>
- ▶ Benefits of pressurized nasal ventilation have been clinically demonstrated<sup>3</sup>



# End Tidal CO<sub>2</sub> Sample Video Sequence

