

# BRIC working group: contraindications of supplemental oxygen with specific drugs and COPD

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# Anaesthesia Pre-oxygenation



- Almost universally used
- 100% for 4 minutes
- Washes out nitrogen from the FRC
- Little washout of dissolved nitrogen
- Needs anaesthesia breathing system
- ? No atelectasis, free radical damage etc.

# Breath Hold Pre-oxygenation



- 60% High Airflow Oxygen Enrichment (HAFOE) Mask
- 15 lpm oxygen
- Entrain 15 lpm air
- 30 lpm fresh gas flow
- Exceeds peak inspiratory flow
- FRC oxygen increases to 60%
- Little washout of dissolved nitrogen



**Bleomycin**  
for Injection, USP

**30 units per vial**

For intravenous, intramuscular,  
subcutaneous, or intrapleural use.

**Caution: Cytotoxic - Special  
handling procedures.**

Single Dose Vial

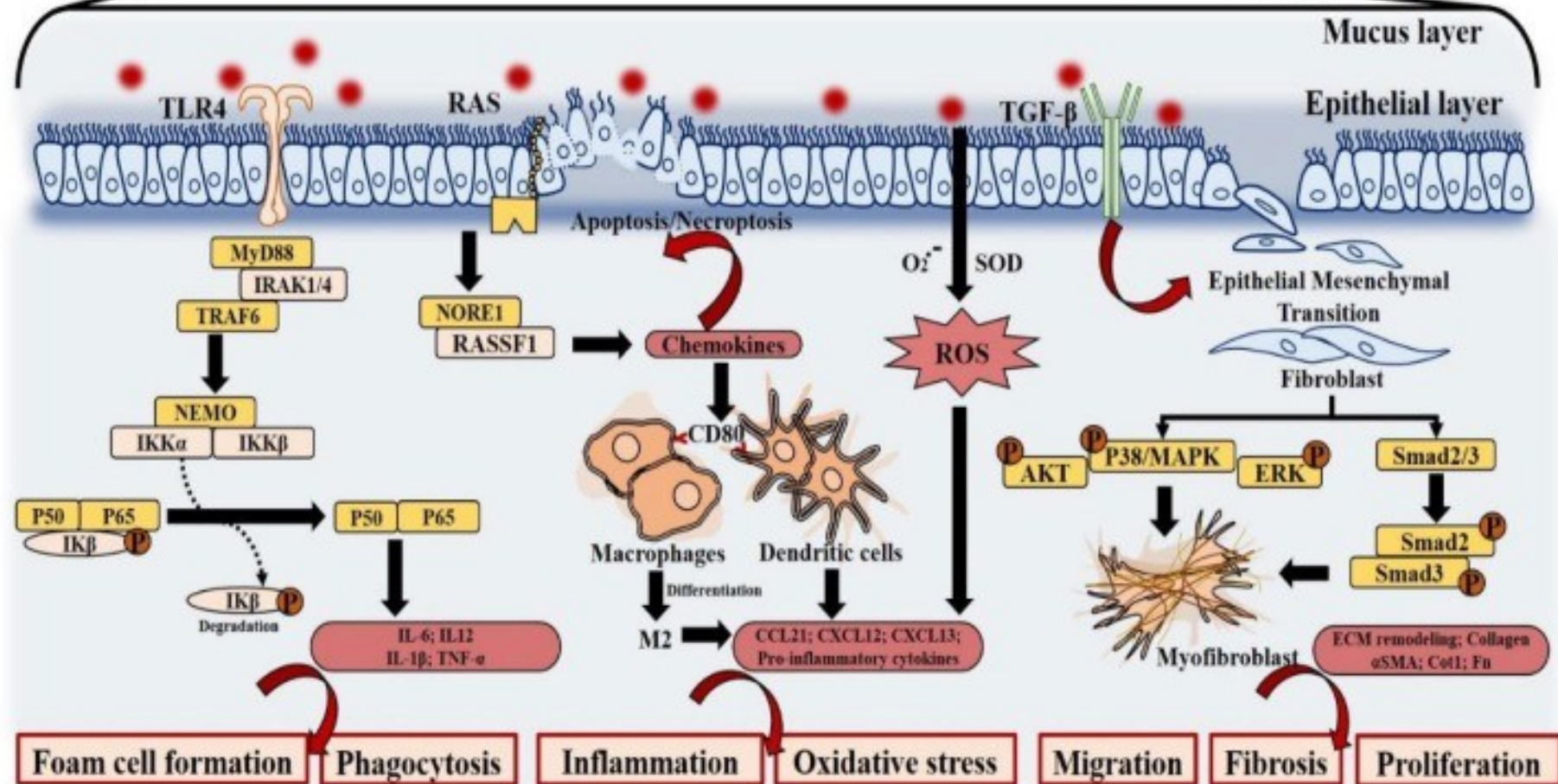
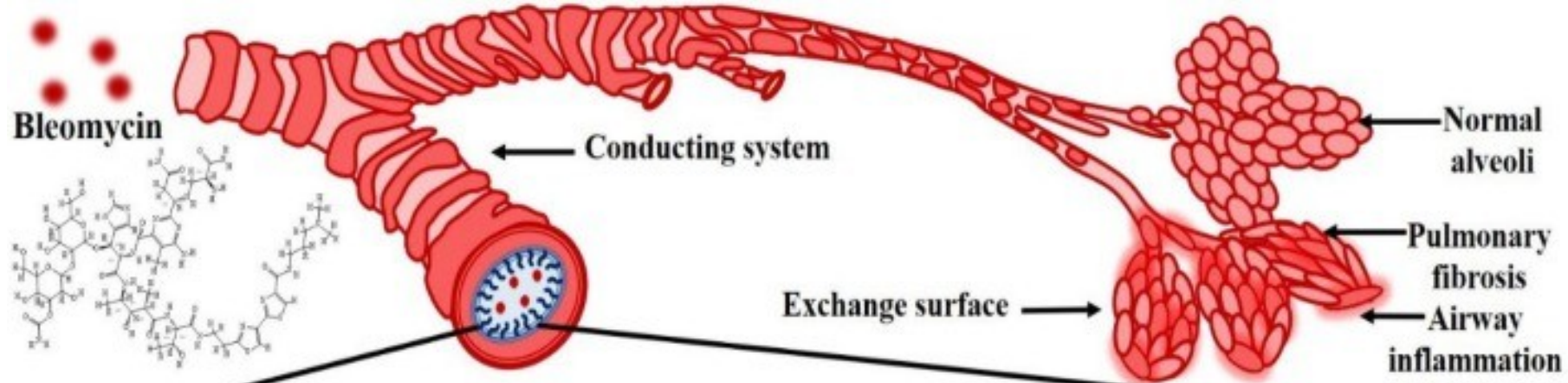
Rx only

Pharmacia Corporation, Kenilworth, NJ 07033

# Bleomycin



- Glycopeptide antibiotic
- Rare anecdotal reports of fatal lung inflammation (3-18%)
- Some delayed by years
- Reported after as low as 30% oxygen
- Some response to steroids
- RCT unlikely
- Risk : Benefit

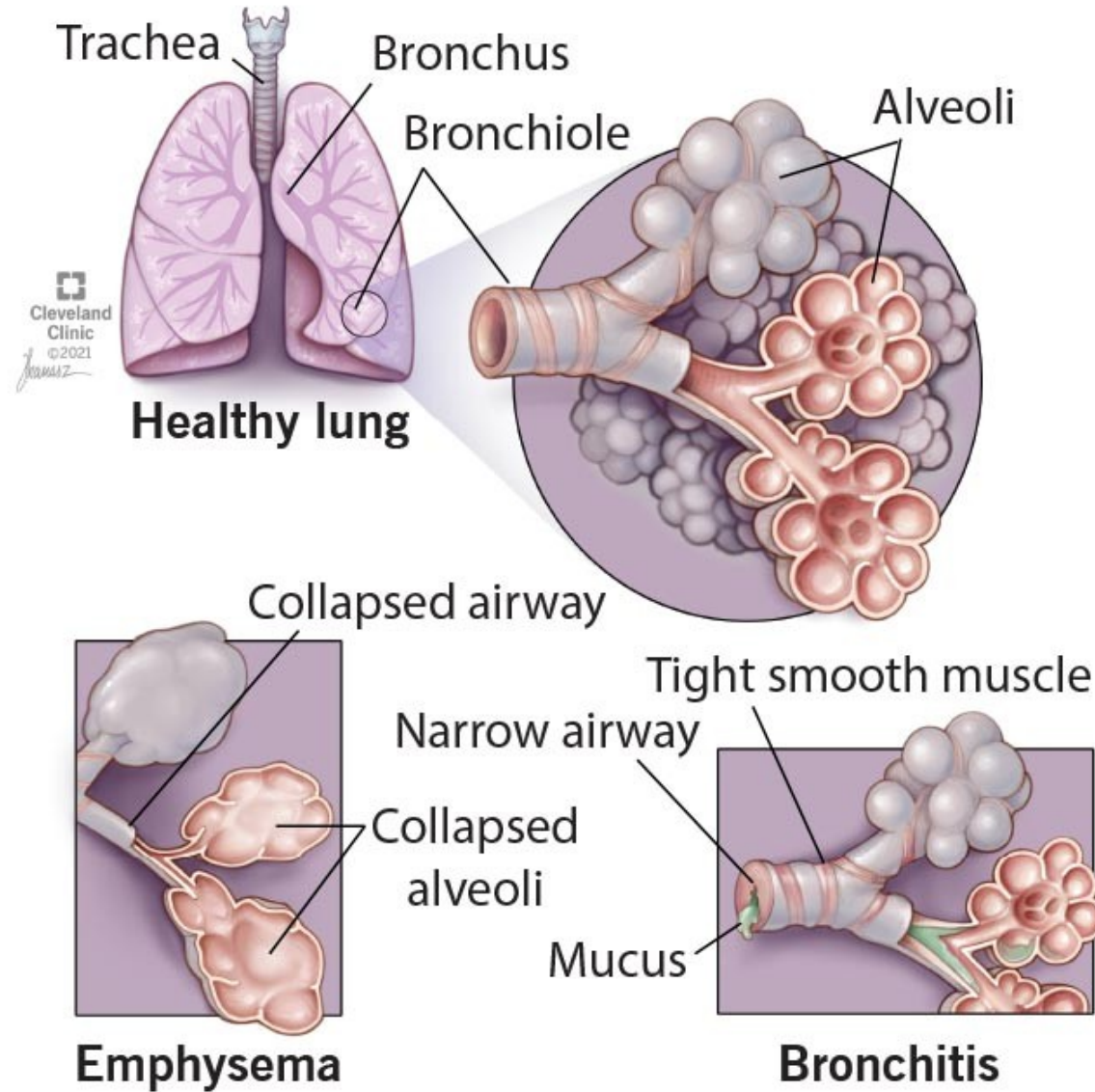


# Amiodarone

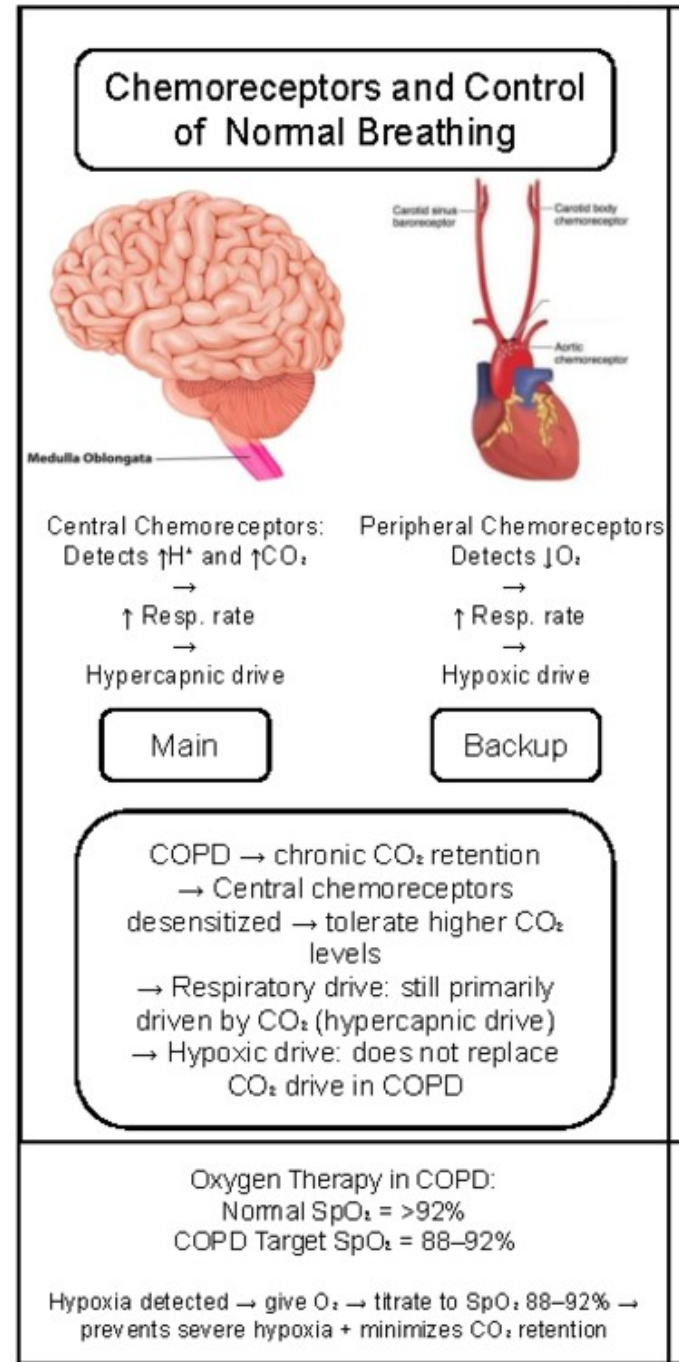


- Anti-arrhythmic
- Rare anecdotal reports of fatal lung inflammation (1-5%)
- Increase risk with high oxygen concentrations
- ? occur when treatment stopped
- RCT unlikely
- Risk : Benefit

# Chronic Obstructive Pulmonary Disease (COPD)



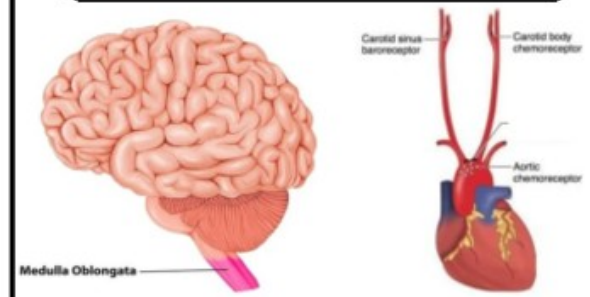
# Hypoxic Drive in COPD



# Oxygen-Induced Hypercapnia in COPD

mechanisms ↑ CO<sub>2</sub>

## Chemoreceptors and Control of Normal Breathing



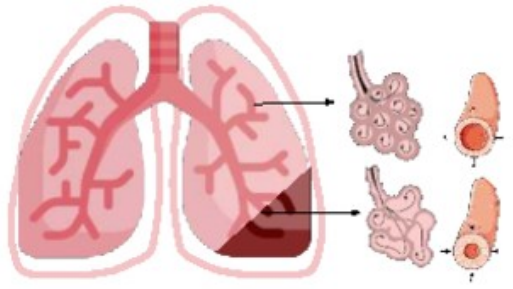
<p><b>Central Chemoreceptors:</b> Detects ↑H<sup>+</sup> and ↑CO<sub>2</sub></p> <p>→ ↑ Resp. rate</p> <p>→ Hypercapnic drive</p> <p><b>Main</b></p>	<p><b>Peripheral Chemoreceptors:</b> Detects ↓O<sub>2</sub></p> <p>→ ↑ Resp. rate</p> <p>→ Hypoxic drive</p> <p><b>Backup</b></p>
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COPD → chronic CO<sub>2</sub> retention  
 → Central chemoreceptors desensitized → tolerate higher CO<sub>2</sub> levels  
 → Respiratory drive: still primarily driven by CO<sub>2</sub> (hypercapnic drive)  
 → Hypoxic drive: does not replace CO<sub>2</sub> drive in COPD

Oxygen Therapy in COPD:  
 Normal SpO<sub>2</sub> = >92%  
 COPD Target SpO<sub>2</sub> = 88–92%

Hypoxia detected → give O<sub>2</sub> → titrate to SpO<sub>2</sub> 88–92% → prevents severe hypoxia + minimizes CO<sub>2</sub> retention

## 1 Pulmonary Vasoconstriction in Response to Poorly Ventilated Alveoli



Damaged alveoli / poor ventilation (↓V)  
 → Pulmonary vasoconstriction in affected areas  
 → Blood redirected to better-ventilated alveoli  
 → Helps maintain V/Q matching & limit CO<sub>2</sub> buildup

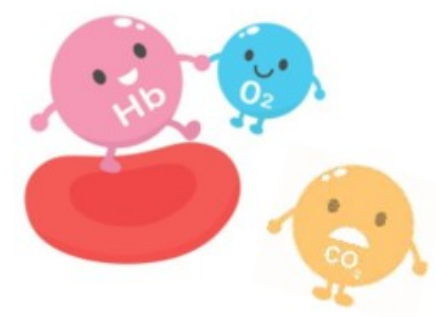
If O<sub>2</sub> ↑ → capillaries in poorly ventilated alveoli dilate  
 → Blood redirected to damaged alveoli  
 → Blood away from well-ventilated alveoli  
 → Less gas exchange occurs  
 → **Worsened V/Q mismatch** → CO<sub>2</sub> buildup

V/Q mismatch + Haldane effect → ↑CO<sub>2</sub>  
 → ↑CO<sub>2</sub> reacts with water in the blood to form carbonic acid (H<sub>2</sub>CO<sub>3</sub>)  
 → ↓ Blood pH → Acidosis  
 → **Severe** acidosis impairs brain function → CO<sub>2</sub> narcosis

## 2 Haldane Effect and CO<sub>2</sub> Retention

The **Haldane Effect** states that when oxygen binds to haemoglobin, it reduces hemoglobin's ability to carry CO<sub>2</sub>.

Over-oxygenation → O<sub>2</sub> displaces CO<sub>2</sub> from hemoglobin (Hb)  
 → More CO<sub>2</sub> stays in plasma → blood CO<sub>2</sub> rises  
 → Contributes to hypercapnia in COPD patients



CO<sub>2</sub> narcosis Signs/Symptoms:

- Confusion
- Drowsiness
- Slurred speech
- Decreased LoC
- **Respiratory depression**
- **Coma**

