



# RC-170 Week Three

O<sub>2</sub> transport, O<sub>2</sub>  
toxicity, O<sub>2</sub> safety,  
O<sub>2</sub> Cylinder  
Duration Calculation

# O<sub>2</sub> transport

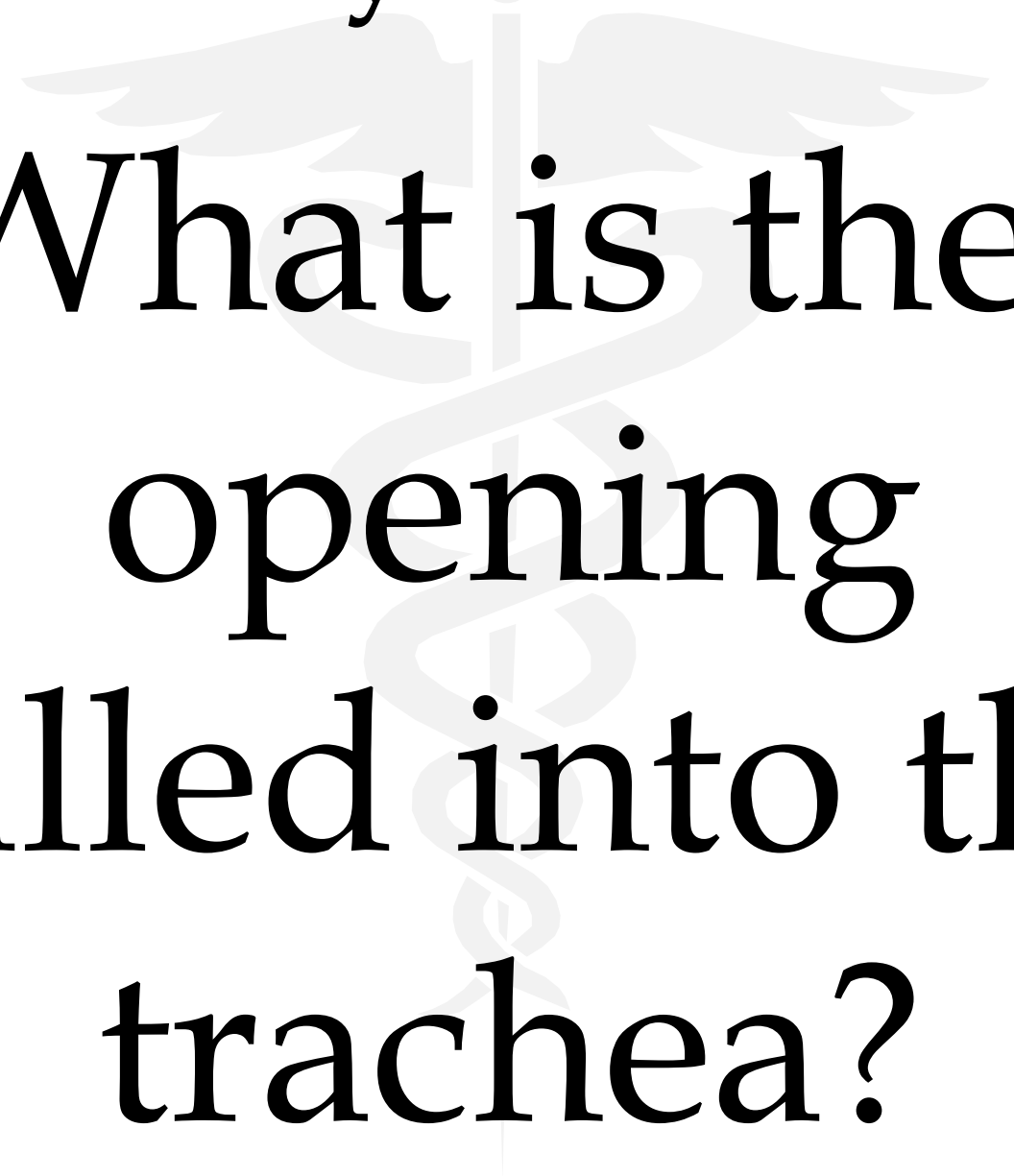
- P O<sub>2</sub> In room air enters nose and/or mouth at approximately -149-159mmHg.
- Then, oral cavity, back of throat, and through the opening to the *windpipe*. P O<sub>2</sub> unchanged.

**Wake Up!**

What is the  
*“windpipe”* ?

**Stay Awake!**

What is the  
opening  
called into the  
trachea?



# Oxygen Transport Continued...

- PO<sub>2</sub> Starts to fall after entering the trachea.
- The air splits at the end of the trachea, into the right and left main stem bronchus.

# Oxygen Transport Continued...

What is this  
*“bi for k tion”*  
called?

# Oxygen Transport Continued...

- Then O<sub>2</sub> proceeds to the various bronchi, to the *alveoli*
- P<sub>AO<sub>2</sub></sub> can then be calculated at ~ 109 mmHg.

# Oxygen Transport Continued...

- Oxygen then diffuses across the Alveoli/capillary membrane into the pulmonary vein.
- Oxygen then moves into the left heart(atrium) and into the left ventricle.
- From there it is pumped to the arteries.
- The PaO<sub>2</sub> is now ~ 95 mmHg.

# Oxygen Transport Continued...

- From the arteries to the ***TISSUES!***
- In the cells the PaO<sub>2</sub> may be as low as
  - 1 - 10 mmHg
- Then, having given up O<sub>2</sub> to the tissues, blood with less O<sub>2</sub> enters the veins and returns to the Rt. Atrium of the heart.
- PvO<sub>2</sub> is ~ **40 mmHg**

# Oxygen Transport Continued...

- Rt. Atrium, Rt. Ventricle and then the Pulmonary Artery.
- Then to the Pulmonary Capillary bed where O<sub>2</sub> and CO<sub>2</sub> are exchanged with the Alveoli.
- Then into the Pulmonary Vein and go back to slide # 10 and so on...

# Summary Exercise:

- **Important points:**
  - Notice the change in PO<sub>2</sub> as it moves through the body. Why?
  - Heart has how many pumping chambers?
  - Where is PO<sub>2</sub> highest, and Lowest?
  - Notice the relationship of one PO<sub>2</sub> with the next one down the line.
  - When O<sub>2</sub> is used at the tissues this is called?
  - When O<sub>2</sub> is NOT used at the tissues this is called?

# Practice Problem 3

$$FIO_2 = 1.00$$

What is  $PAO_2$ ?

In a normal patient, what will the  $PaO_2$  be?

# O2 toxicity



- O2 is a drug, only MDs can prescribe, not RCPs.
- True or False?



**O<sub>2</sub> toxicity**

Are there  
exceptions to this?

**O<sub>2</sub> toxicity**

Are there  
exceptions to this?

*Emergencies*

**O<sub>2</sub> toxicity**

Are there  
exceptions to this?

*Protocols*

# How is dangerous to patients?



- Lung Damage
- Eye Damage
- Cilia Damage
- Stop Breathing
- Cause alveoli to collapse

# How is dangerous to patients?

- ✦ Lung Damage  $\rightarrow FIO_2 > .50$
- ✦ Eye Damage  $\rightarrow PaO_2 > 100$
- ✦ Cilia Damage  $\rightarrow FIO_2 > .21$
- ✦ Stop Breathing  $\rightarrow PaO_2 > 60$
- ✦ Cause alveoli to collapse  
 $\rightarrow FIO_2 1.00$

# O2 Safety



- Never give more than is needed to keep a patient alive, especially do not give high doses for long periods.

High is above 40 to 50%  
Oxygen.

# O2 Safety

📄 Does O2 explode?

📄 Does O2 burn?

📄 Is it Flammable?

📄 Will it cause an explosion?

# Cylinder Calculation

$$\text{1st factor} = \frac{\text{Cubic ft. when full} \times 28.3}{\text{Pressure in PSI when full}}$$

$$\text{1st factor} = \frac{244 \times 28.3}{2200 \text{ PSIG}}$$

# Cylinder Calculation

2nd factor = 1st factor x current PSIG

This equals the liters left in cylinder.

**2nd factor = 3.14 x 1500 PSIG, for example.**

# Cylinder Calculation

3rd factor = Current liter that are usable

Rate of use, in liters per minute

**3rd factor= 3140 liters(safety factor 500PSIG)**

**10 liters per minute**

# Cylinder Calculation

3rd factor = **314** minutes of  
usable O<sub>2</sub>

4th factor = When to return to change  
the cylinder?

# Calculate:



- It is now 10am
- What time will you come back to change the cylinder in the above situation?

# Calculate:

- Cylinder holds 400 cubic feet when full.
- Safety factor at your hospital is 300PSIG
- It is now 12 noon.
- Patient is getting O<sub>2</sub> at 7 LPM.
- Cylinder gauge reads 1200PSIG.
- What is the 1st factor for this cylinder?
- What time should you return to change?
- What time will the cylinder be empty?