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RSPT 1410
Atmospheric Gases

Wilkins, Fundamentals of Respiratory Care
p. 105-108

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Atmospheric Gases

- Oxygen (O₂) is the _____ abundant atom in our atmosphere, _____ is 1st, _____ is 2nd
- _____ is the primary producer and regulator of O₂ in the atmosphere
- O₂ is _____

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Atmospheric Gases

| | |
|-------------------------------------|--------|
| • Nitrogen (N ₂) | 78.08% |
| • Oxygen (O ₂) | 20.95% |
| • Argon (Ar) | 00.93% |
| • Carbon Dioxide (CO ₂) | 00.03% |
| • Trace gases | 00.01% |

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Atmospheric Gases

- Atmospheric pressure is the _____ by our atmosphere
- Barometric pressure
 - psi (pounds per square inch - direct)
 - mmHg (millimeters of mercury - indirect)
- Sea Level
 - _____ psi
 - _____ mmHg

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Atmospheric Gases

- Dalton's Law of partial pressure = _____
- The pressure exerted by O₂ is known as the _____, the pressure exerted by CO₂ is known as the _____, etc.
- Applying Dalton's Law
 $PO_2 + PN_2 + PCO_2... = P_B \text{ or } P_T$

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Atmospheric Gases

- Determining partial pressures
 - % of gas (as a fraction) x total pressure
 - **PO₂** 0.2095 x 760 = _____ mmHg
 - **PN₂** 0.7808 x 760 = _____ mmHg

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Atmospheric Gases

- Normal P_B is determined, in part, by altitude (values are approximate)
 - Galveston (sea level) = 760 mmHg
 - Amarillo (3600 ft) = 668 mmHg
 - Denver (5000 ft) = 632 mmHg
 - Mt. McKinley (20,000 ft) = 349 mmHg
 - Cruising altitude (35,000 ft) = 179 mmHg

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Atmospheric Gases

- So...
 - PO_2 in Galveston = 159 mmHg
 - PO_2 in Amarillo = 140 mmHg
 - PO_2 in Denver = 132 mmHg
 - PO_2 on Mt. McKinley = 73 mmHg
 - PO_2 at cruising altitude = 38 mmHg

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Atmospheric Gases

- How does this affect us?
- Four oxygen measurements
 - inspired air ($F_I O_2$) =
 - inspired air ($P_I O_2$) =
 - alveolar air ($P_A O_2$) =
 - arterial blood ($P_a O_2$) =
- $P_a O_2$ is the one we most need to monitor and correct

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Atmospheric Gases

- $F_{I}O_2$ and consequently, the $P_{I}O_2$ ultimately determine _____
- If a patient's P_aO_2 is below an acceptable level (hypoxemia), what can we do?
- If $F_{I}O_2$ is the key, can we change it from 0.21?

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Atmospheric Gases

YES!

And that is the basis for one of the therapy modalities we use most...

oxygen therapy

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Atmospheric Gases

- O_2 therapy is a method of increasing the $F_{I}O_2$ by adding _____
- $F_{I}O_2$ can be increased from the room air value of _____
- In *most, but not all*, cases, if $F_{I}O_2$ is increased, _____ will also increase
