

Hyperbaric, uses for the Spine

2017 Castellvi Spine

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Disclosure

- Former Special Operations Officer USN (Income)
- Special committee for ABS (Building Undersea Vehicles and Hyperbaric Systems)
- BOD IBUM (Income)
- Poseidon Project 100 Day Undersea Mission
- Blue Team Mission Commander – MDRS 195 - Civilian



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What is it?

- Hyperbaric Oxygen therapy (HBOT) is the administration of pure oxygen at greater than normal partial pressure in order to help a patient with certain conditions.
- HBOT's main advantage is that it provides an alternate path for oxygen delivery.

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What is it?

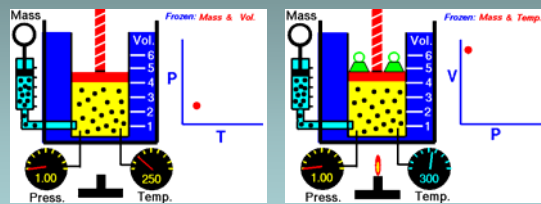
■ **General Gas Law:** The factors of temperature, volume and pressure are so closely related that a change in one must have a corresponding change in one or both of the other.

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

■ **Dalton's Law:** The total pressure exerted by a mixture of gasses is equal to the sum of the pressures of each of the different gasses making up the mixture, with each gas acting as if it alone was present and occupied the total volume.

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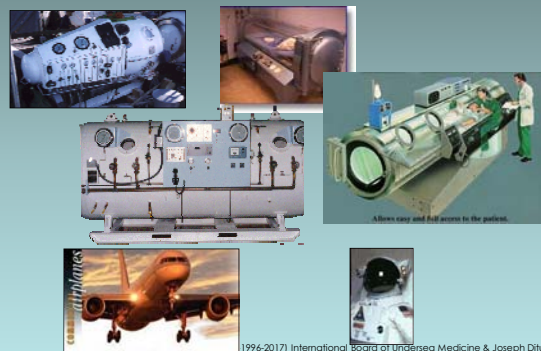
What is it?



■ If a patient is exposed to greater than 1.0 PPO₂, blood plasma and cerebrospinal fluid begin to transport oxygen.

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Types of chambers



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UHMS approved indications

- | | |
|--|--|
| 1. AGE | 9. Osteomyelitis |
| 2. Carbon monoxide poisoning | 10. Necrotizing soft tissue Infections |
| 3. Crush Injury / compartment syndrome | 11. Delayed radiation injury |
| 4. Gas gangrene | 12. Compromised flaps and grafts |
| 5. DCS | 13. Acute thermal burn Injury |
| 6. Arterial insufficiencies | 14. Idiopathic sudden sensorineural hearing loss |
| 7. Severe anemia | |
| 8. Intercranial abscess | |

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MOAs

1. Hyperoxygenation
2. Decrease bubble size
3. Reduces lipid peroxidation
4. Vasoconstriction
5. Reduces intravascular leukocyte adherence
6. Toxin inhibition
7. Promotes leukocyte oxidative killing
8. Antibiotic synergy
9. Angiogenesis
10. Fibroblast proliferation / collagen synthesis

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A few papers about spine

- Role of HBOT in treatment of bacterial spinal Osteomyelitis – Applied Neurosurgery Spine (June 09 Vol 10 P 16-20)
HBOT enabled infection cure in 5 of 6 pts w / OM
- Efficiency of HBOT in Iatrogenic Spinal Infections
Spine (Nov 2015 Vol 40 Issue 22 P 1743-1748)
HBOT ...is safe and efficient as an adjunctive therapy in treatment of infections. ...effective in prevention of revision procedures and instrumentation failures in iatrogenic osteomyelitis cases...

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A few papers about spine

- Bone healing and spinal fusion – Neurosurgery focus 2002 13(6) [Medscape]
...**hyperbaric oxygen treatment has been found to enhance bone healing.**
- The role of HBOT in Sports Medicine – Journal of Sports Medicine (Dec 2001) P 395-403
Appears to have efficacy in recovery of sports injuries...researchers need to add to the base of clinical trials

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Conclusions

- No specific approved indication relating to spine save Osteomyelitis.
- Few studies are performed.
- We intend to work past that.

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THANK YOU – Questions?

- Discussion?

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