

Hyperbaric Oxygen Therapy (HBO)

Outline:

- What is HBO
- How is it provided (the environment).
- Indications for use
- How does it work ?
- Safety issues.
- Patient selection for HBO.
- +/- Current explorations

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What is HBO

- Is Not
 - topical oxygen
 - regionally applied oxygen under pressure
- Is:
 - Perfusion based delivery of pharmacologic doses of oxygen to all tissue.

For more info visit:

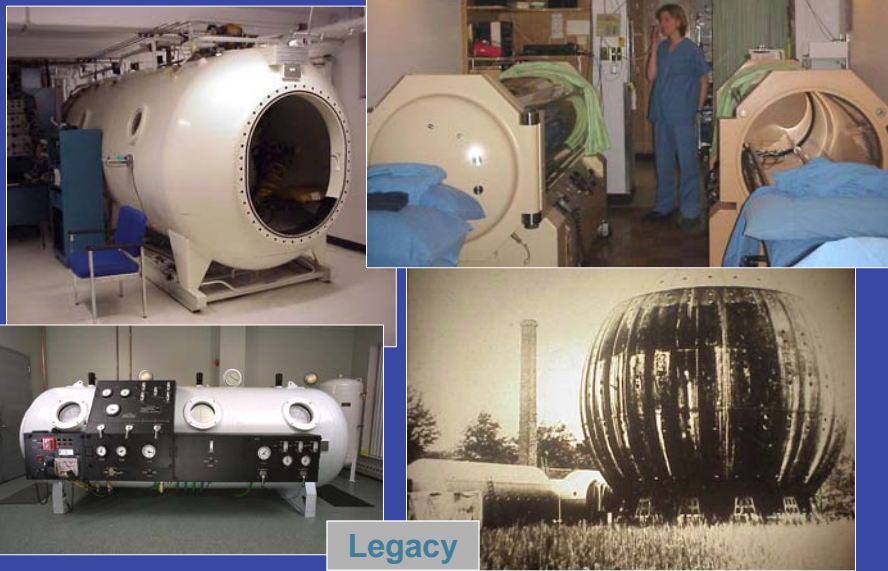
hyperbaricmedicine.ca

or

contact Dr. Evans:

wayne.evans@utoronto.ca

Hyperbaric- Chamber Designs



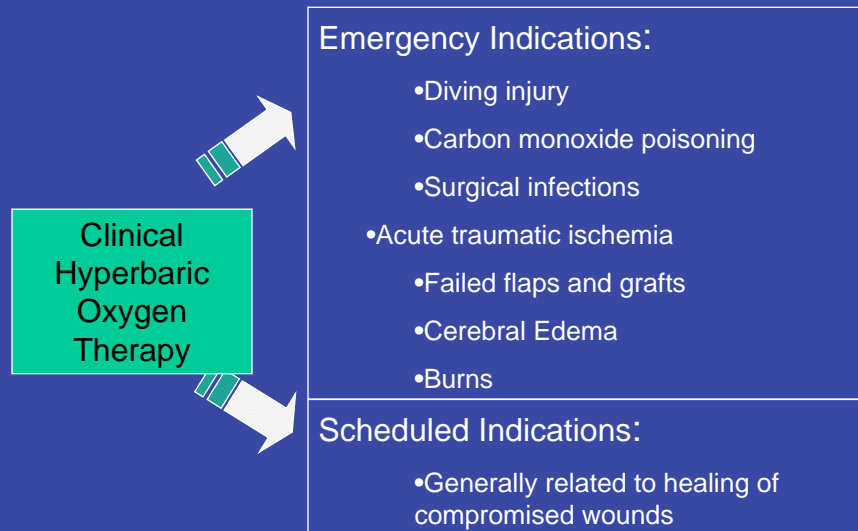
Legacy

Hyperbaric- Chamber Designs are advancing to meet clinical needs



Modern Design

Clinical Hyperbaric Oxygen Therapy



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Why Focus on the Diabetic Foot ?

- Lets look at the challenges faced by the diabetic:
 - Neuropathy
 - Deformity
 - Impaired Host Defenses and Tissue Repair
 - Vasculopathy

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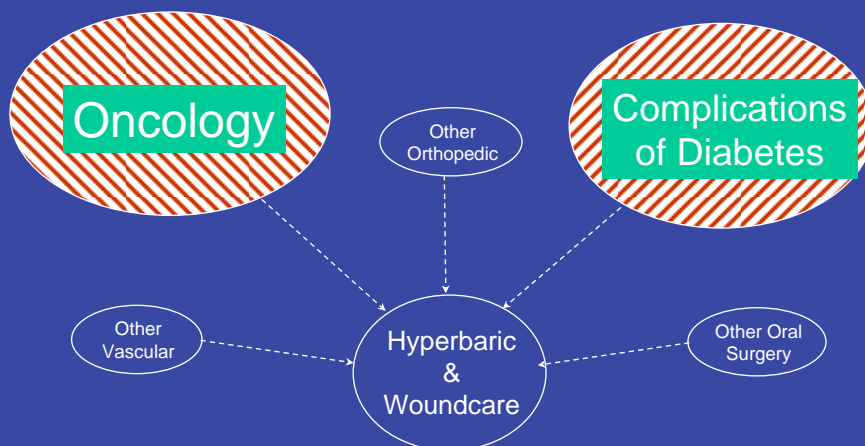
Outcome:

- 15% of Diabetics suffer ulceration
- Lose one leg = lose 2nd soon after.
- Hi mortality after 2nd limb lost.



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Patients Referred for Scheduled Course of Hyperbaric Oxygen Therapy



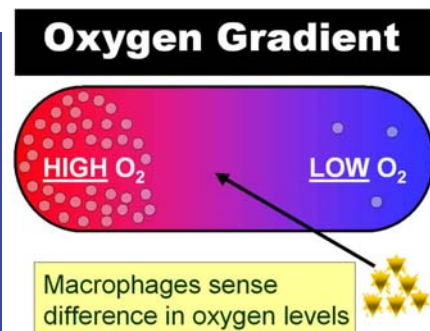
What problem do these populations share in common?

Tissue Compromise –

- Hypoxia – generates signal to commence wound healing cascade
- Hyperbaric Oxygen environment augments the signal
- Action – HBOT acts as a signal transducer.

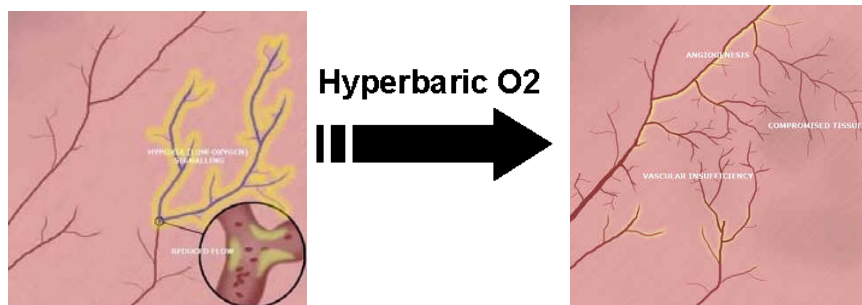
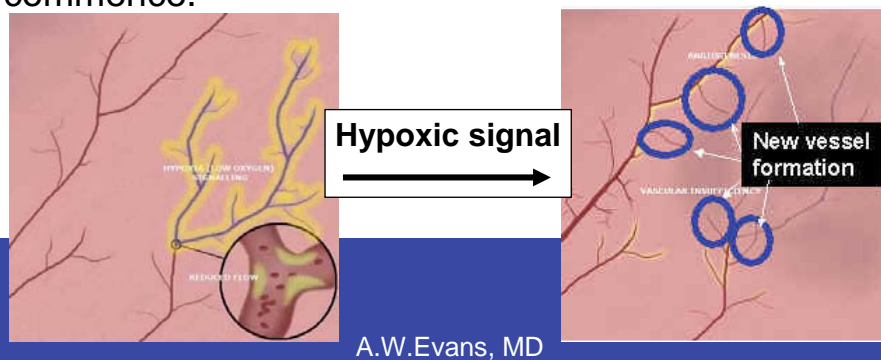
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- Multiple components are involved with cell to cell communication.
- One of these is a white blood cell called the macrophage.
- The macrophage is sensitive to variations in levels of oxygen present in the tissues ie sensitive to an oxygen gradient.



Persistent Hypoxia signal results in an attempt , by local tissues to build new blood supply to the affected area.

This is how tissues communicate to other neighboring structures, the need for routine tissue repair to commence.



Note that although there may be insufficient stimulus to initiate the tissue repair cascade under normal conditions, by increasing the local oxygen delivery the oxygen gradient is magnifiedresulting in a stronger signal and augmented repair.

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Vascular Rehabilitation – 6 wks

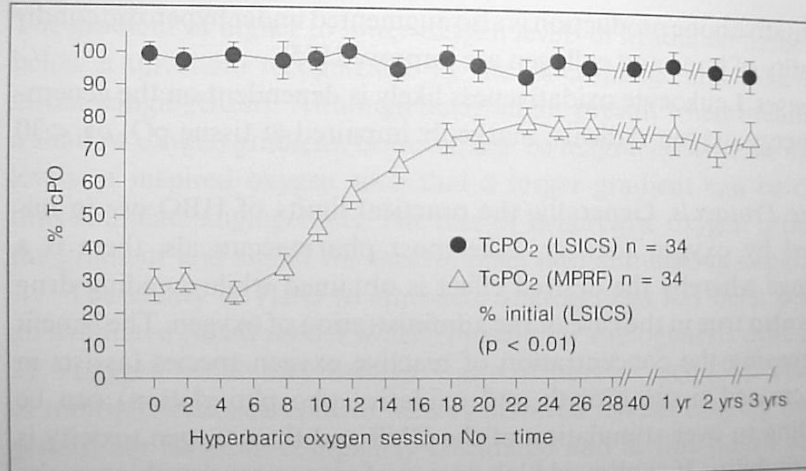


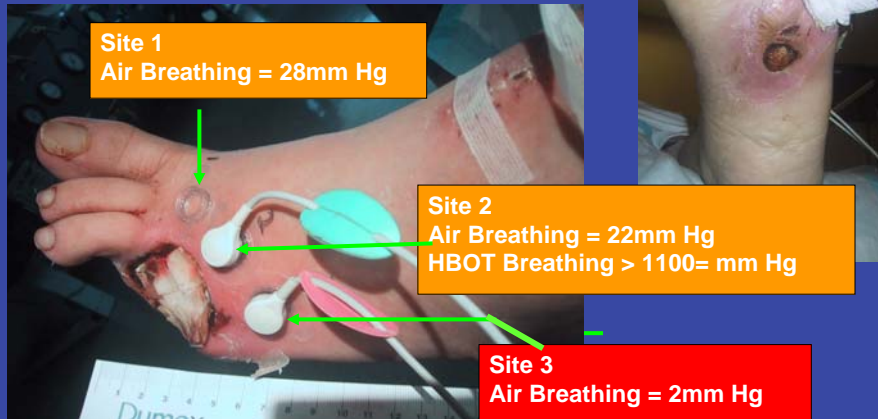
Fig. 3. Illustrations depicting the lag and proliferative phases of oxygen-gradient related angiogenesis

Tissue Oxygen Measurement via transcutaneous oximetry



Mr.H

Deep space infection – concern re: viability of plantar arch



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Evidence: Diabetic Foot

- Prev work
 - Faglia 1996 –comprehensive care including HBO reduced major amputation rate by 75%
- Newer Work
 - Abidia 2003
 - Treat 4 to save 1 leg
 - Cochrane Review 2004
 - In people with foot ulcers due to diabetes, HBOT significantly reduced the risk of major amputation and may improve the chance of healing at 1 year.

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Diving Environments - (and their hazards)



HYPERBARIC OXYGEN SAFETY Occupant Selection

- Physical Condition
 - Absolute Exclusions
 - Risk of gas trapping in Lungs
 - Relative Contraindications
 - Ears / Sinuses
 - Confinement issues / O₂ toxicity

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