

Address by Dr Phil Bryson. Diving Diseases Research Centre, Plymouth.

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Hyperbaric Medicine ~ still snake oil?

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Dr Bryson explained he became interested in hyperbaric medicine when he was sent as an A&E SHO to take a diver with "the bends" to the hyperbaric chamber in Fort Bovisand - a Napoleonic Fort used as a commercial diver training centre.

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In 1983 the use of hyperbaric oxygen was extended when Exeter accidentally overdosed a number patients with radiotherapy causing tissue damage. The oncology professor asked the unit to treat these patients knowing that hyperbaric oxygen would aid their healing, which it did.

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Hyperbaric chambers had previously been in use in the UK as a "cure all", but fell into disrepute when they were proven to be of no real use in multiple sclerosis.

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Hyperbaric medicine does have a niche in medicine, a small but important one. Randomised controlled clinical trials need to be published to prove this use. A new monoplace chamber in St Joseph's in Newport will be ideal to assist in research under the auspices of the DDRC at Plymouth, now based at Derriford Hospital.

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Pictures were shown of the earliest chambers, Fontaine's mobile hyperbaric chamber built in 1879 could administer air under pressure and Cunninghams chamber built in 1928 was a sort of mobile hyperbaric hospital.

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The hyperbaric chamber is now a sophisticated affair that is "walk in - walk out". Several people can be treated at one time and attendants are present to monitor them. There is sufficient space to allow a patient in a bed to be treated and specially trained "intensivists" stay in the chamber with them.

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Hyperbaric Oxygen therapy means the patients are given 100% oxygen at pressures greater than that at sea level. The chamber is pressurised with air and 100% oxygen is given via masks or hoods.

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The monoplace chamber can be pressurised on either oxygen or air, and the patient inside is unable to discern which gas they are breathing, making it ideal for random controlled trials.

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Hyperbaric medicine can be used for many conditions,

- Air or gas embolism
- Carbon monoxide or smoke inhalation
- Gas gangrene
- Crush injuries
- Decompression sickness
- To enhance healing

- In exceptional blood loss
- For intracranial abscesses
- Necrotising skin infections
- Delayed radiation injury! and many more!

Essentially, hyperbaric oxygen will only work where there are either gas bubbles or hypoxia.

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The effect of hyperbaric oxygen is to supersaturate the plasma, (the red cells already being pretty full of oxygen) which means it can be carried easily to the hypoxic tissues where it will readily give up its oxygen to the tissues.

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Oxygen can reach the tissues by perfusion and diffusion. The higher the oxygen level the more will be delivered to the tissues. Oxygen is needed by ATP to allow the production of energy to drive the cells.

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Oxygen is needed for the proper working of phagocytes..to engulf bacteria, and for oxidative killing. It is needed by fibroblasts to allow their proliferation and to produce collagen.

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Hyperbaric oxygen is excellent in damaged tissues where there is poor blood flow and swelling. It allows oxygen to reach oedematous cells allowing cell function to work again thus reducing the swelling. However it is correctly used as an adjunct to medicine and there should be a multidisciplinary approach.

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A Cochrane review supports the fact that healing rates of diabetic ulcers have been good and decreases the need for amputations. Good orthotics is important following healing.

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When patients with ulcers are treated with hyperbaric oxygen, transcutaneous oxygen monitors are placed adjacent to the ulcers to ensure good oxygen delivery.Â The blood supply remains important, but even with a poor main artery, collateral blood flow can be encouraged.

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Radiation damage causes capillary endarteritis leading to hypoxic hypovascular tissues. It has been shown that treatment with hyperbaric oxygen improves the tissues with each treatment and encourages neovascularisation.

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Osteoradionecrosis can occur many years after the treatment was given, and is of particular importance in maxillofacial reconstruction. Osteointegrated facial implants following radiation survive longer when the bony bed is improved.

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Hyperbaric oxygen therapy cannot revive dead tissue, it must be removed. It can help hypoxic tissue to recover.

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There are side effects, such as middle ear and sinus barotrauma, temporary myopic shift and rarely neuro or pulmonary toxicity. The risk of fire is great as oxygen supports combustion and there is an oxygen rich atmosphere in the chamber. Safety precautions are paramount;

patients must wear oil free clothing and avoid taking anything that may "spark" into the chamber. The chamber is equipped with a "deluge system" and tenders are trained in "fire escape routines".

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Dr Bryson took questions from the floor and told some anecdotes about interesting cases.

Dr Wood thanked Dr Bryson for an interesting and stimulating talk