Hyperbaric Oxygen Therapy for Neurologic Diseases and Cerebral Palsy

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Introduction
Neural tissue sensitivity to hypoxia has always presented an attractive and logical area for clinical studies involving Hyperbaric Oxygen Therapy (HBO), in a variety of neurologic diseases involving ischemia, edema and in recent times, prevention of apoptotic damage. Additional evidence has been growing on the ability of HBO exposure to enhance the natural stem cell growth and colonization in tissue repair. However the robust laboratory data have not been translated yet in clear clinical indications for HBO in selected neurological syndromes. It comes as little surprise, therefore, that none of these diseases have received approval from the FDA as indications for HBO, and reimbursement by insurance agencies, in broad terms, is usually denied. The following is a brief synopsis of major applications and clinical data from patients studies published in the last few years, also discussed in a recent review.1

Ischemic stroke: There is evidence from multiple animal models and limited human patient series that there is clinical benefit from HBO treatment, usually 1 hr long treatment, 2-3 ATA, multiple times. Early treatment is necessary; usually with the first treatment within 6 hr. Animal results show reduced edema and delayed or absent apoptosis. None of the human protocols completed shows extended benefit, especially after several months, but none of the human studies did yet enroll patients less than 24 hr after the onset of stroke symptoms.

Radiation-induced cerebral necrosis: only a single randomized study was published, with weak but encouraging results. The radiation event was at least 1.5 yr old at the time of hyperbaric exposures. We need more studies, as several individual reports are quite favorable for subjective symptomatic improvements.
**Traumatic Brain Injury:** This is an area of great promise, as some sustained results were shown in non-blinded studies from a large group of patients. More rigorous studies are needed before specific HBO regimens can be recommended.

**Multiple Sclerosis:** Interest in HBO2 was high in the ’80s and was produced usually after 2ATA exposures, 90 min for 20 treatments. Several studies showed some improvement, usually up to 6 months, but not lasting up to 12 months. In most studies patients were enrolled at a chronic or advanced stage in the disease and presented with significant disability. These patients will not improve, not even transitorily, from HBO therapy. Milder form of the disease might show better clinical utility for HBO, but there is less interest today, as stronger medical treatments are looming.

**Cerebral Palsy:** Two studies of good clinical validity have been completed, and a systematic review of the field has been published. The stronger randomized study has a few flaws, for the large spread of symptoms in patients enrolled, and demonstrates equivalent improvements in motor function both for the treatment and the control group: after 1.75 ATA O2 for 40 daily treatments (HBO treatment arm), as well as in the control arm (compressed air at 1.3 ATA for 40 treatments). This was interpreted by some as no effect from HBO, and by others as a significant motor improvement from “mild” (1.3 ATA) hyperbaric air exposure, when compared to the starting level of disability. Despite some impressive individual improvements and video demonstrations, the clinical utility of HBO in this area is not demonstrated.

There has been an explosive increase in number of treatments with “mild HBO” regimens for a variety of chronic and/or congenital neural dysfunctions. The largest group of patients is suffering from Autism, and the recommended treatment is usually at 1.3 to 1.4 ATA, using compressed air or O2 enriched air. Most of the equipment is available for rent in the Internet and is not subjected to rigorous medical dispensing. A rigorous prospective Autism study is presently being organized by our group in Tampa, Florida.

**References:**