

## **COGNITIVE AND CEREBRAL BLOOD FLOW IMPROVEMENTS IN CHRONIC STABLE TRAUMATIC BRAIN INJURY INDUCED BY 1.5 ATA HYPERBARIC OXYGEN.**

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**Background:** Following severe traumatic brain injury, cognitive improvement is most dramatic the first six months following injury and largely stasis after 18 months. Anecdotal reports exist that attest to the efficacy of HBOT to improve posttraumatic neurologic deficits by increasing blood flow in the ischemic penumbra despite protocol differences. CBF, speech, neurological and cognitive testing have not been studied serially in patients undergoing HBOT for chronic stable TBI.

**Methods:** Five patients with TBI, at least 3 years post injury, underwent 120 HBOT's at 1.5 ATA for 60 minutes. They received 80 HBOT's, a 5 month rest, and a second set of 40 HBOT's. Patients were studied sequentially to determine HBO's effects on: CBF, speech fluency, neurologic, cognitive and progressive exercise testing. Six TBI controls were not treated with HBOT, but underwent serial SPECT scanning to study temporal alterations in cerebral blood flow. Five non-TBI controls underwent SPECT scanning, one HBOT, and a repeat scan to study HBOT influence on cerebral blood flow in normal subjects. SPECT brain scans were performed serially on the HBO treated group. Scans were spatial and intensity normalized and subjected to statistical parametric mapping.

**Results:** Serial SPECT imaging showed: TBI controls had no significant consistent change in CBF over time; non-TBI controls had essentially no influence from one HBOT upon CBF; treated TBI patients had permanent increases in penumbral area CBF and a regression to a mean CBF range. In the HBO treated group, no changes were seen in progressive exercise and neurologic testing. Speech fluency universally improved, as did group mean scores of memory, attention, and executive function. Improvement peaked at 80 HBOT, suggesting a possible maximum length of treatment between 80 and 120 HBOT.

**Conclusion:** The findings of this prospective pilot study suggest that HBOT at 1.5 ATA is a promising therapy to achieve cognitive improvement and permanently improve the penumbral brain flood flow in chronic stable TBI where no improvement would have been expected.