

PHYSIOLOGICAL VARIABLES ASSOCIATED WITH CENTRAL NERVOUS SYSTEM HYPERBARIC OXYGEN TOXICITY. S. Parker, A. Fahlman, J. Braisted and D. Forcino. Naval Medical Research Center, Bethesda, MD 20889-5607.

One of the toxic effects of hyperbaric oxygen (HBO) exposure is the onset of generalized tonic-clonic seizures. HBO-induced convulsions limit the depth and duration of diving missions, as well as the aggressive use of HBO in clinical treatments. Our swine model of central nervous system (CNS) toxicity included chronic instrumentation to record mean arterial pressure (MAP) and cerebral blood flow (CBF). Once placed in a hyperbaric chamber, animals were monitored for a control period at both 1 atm and at a predetermined environmental pressure prior to switching to 100% O<sub>2</sub>, and then observed for CNS toxicity. At pressure (6, 5, 4, or 3 atm respectively) CBF fell below the 1-atm control. After switching to O<sub>2</sub>, CBF remained constant and then slowly increased beyond the 1-atm control value prior to seizure onset. MAP, as measured through a femoral artery catheter, demonstrated a similar trend. Using Kaplan-Meier survival analysis we determined that there was a significant difference in seizure latency among the groups (P<0.0001, log-rank test). Pair-wise comparison between groups showed that there was no difference in latency at 5 vs. 6 ATA (P<0.11), but a significant difference between animals at 4 vs. 5 ATA (P<0.01) and at 3 vs. 4 ATA (P<0.0001, log-rank test). The changes in variables may serve as reliable predictors of the onset of oxygen toxicity, which will serve to improve the safety of diving operations and clinical treatments requiring HBO. (Support: ONR # 63706N M00096.001-1705)