

DECOMPRESSION SICKNESS RISK REDUCED BY H<sub>2</sub> METABOLISM OF NATIVE INTESTINAL FLORA IN PIGS DURING H<sub>2</sub> DIVES. S.R. Kayar and A. Fahlman. Naval Medical Research Ctr., Bethesda, MD 20889.

Biochemical decompression, the facilitation of decompression by biochemically eliminating some inert gas stored in divers' tissues, was demonstrated in a pig model. To simulate a H<sub>2</sub> dive, pigs (n = 15; 19.6 ± 0.3 kg) were placed in a dry hyperbaric chamber and compressed to 22.2 - 25.5 bar with O<sub>2</sub> and H<sub>2</sub> (84 - 93% H<sub>2</sub>) for 3 h. Chamber concentrations of O<sub>2</sub>, H<sub>2</sub>, He, N<sub>2</sub> and CH<sub>4</sub> were monitored by gas chromatography throughout the dive. Release of CH<sub>4</sub> from the pigs indicated that native intestinal microbes had metabolized H<sub>2</sub>. The CH<sub>4</sub> release rate in each pig increased with H<sub>2</sub> pressure and throughout the 3 h at constant pressure. During the last hour, mean CH<sub>4</sub> release rate ranged from <2 to >10 μmol/min, presumably due to inter-animal variation in intestinal flora. After decompressing at 0.45 bar/min, 20% (3/15) of pigs had severe symptoms of decompression sickness (DCS) within 1 h. Pigs with DCS (n = 3) released 1.8 ± 1.2 μmol CH<sub>4</sub>/min (mean ± 1 SEM) while compressed, whereas pigs without DCS (n = 12) released significantly more (6.7 ± 0.9 μmol CH<sub>4</sub>/min; P < 0.01). Contrary to common experience in diving, DCS risk was not positively correlated with chamber pressure (2/5 at 22.2 bar, 1/5 at 24 bar, 0/5 at 25.5 bar). Thus H<sub>2</sub> metabolism by the native intestinal flora of pigs can protect against DCS following a simulated H<sub>2</sub> dive, if the flora is relatively active. (Support: NMRDC #61153N MR04101.00D-1103; animal use guidelines of NIH Pub. #92-3415, 1992).