DECOMPRESSION SICKNESS RISK REDUCED BY H_2 METABOLISM OF NATIVE INTESTINAL FLORA IN PIGS DURING H_2 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_2 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_2 and H_2 (84 - 93% H_2) for 3 h. Chamber concentrations of O_2, H_2, He, N_2 and CH_4 were monitored by gas chromatography throughout the dive. Release of CH_4 from the pigs indicated that native intestinal microbes had metabolized H_2. The CH_4 release rate in each pig increased with H_2 pressure and throughout the 3 h at constant pressure. During the last hour, mean CH_4 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_4/min (mean ± 1 SEM) while compressed, whereas pigs without DCS (n = 12) released significantly more (6.7 ± 0.9 μmol CH_4/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_2 metabolism by the native intestinal flora of pigs can protect against DCS following a simulated H_2 dive, if the flora is relatively active. (Support: NMRDC #61153N MR04101.00D-1103; animal use guidelines of NIH Pub. #92-3415, 1992).