INTRODUCTION: A model which assesses the risk of decompression sickness (DCS) associated with altitude exposures of various pressures is described. This paper describes how echo imaging techniques can provide critical measurements, such as bubble size, to support the development of a decomposition model. METHOD: Three healthy adult subjects were exposed to a simulated altitude of 29,250 ft. They were monitored with the Hewlett Packard Sonos 1000 echo imaging system at two monitoring sites, the heart and the inferior vena cava (IVC) as viewed through the liver. Consequently, the hepatic veins and bile duct systems were also observed. RESULTS: Bubble size was found to be between 5 and 100 microns both in the IVC and in the hepatic veins. The upper size limit was established by IVC microbubbles flotation rates. Size confirmation was provided by observation of pressure-induced right ventricular bubble resolution. Microbubbles were visualized in the gall bladder and hepatic veins but not in the liver itself. Therefore hepatic tissue bubbles, if they exist, are smaller than intravascular bubbles. This size range was incorporated into the ongoing development of a decomposition model. CONCLUSIONS: Echo imaging is a powerful tool for DCS research and model development.

INTRODUCTION: Computer models which could accurately predict decompression sickness (DCS) for any given hypobaric exposure would be of great improvement over current risk assessment methods based on comparison of the planned mission profile with data from previous, often dissimilar exposures. METHODS: Equations of the perfusion-limited inert gas exchange and bubble growth were used to compute tissue ratio (TR) and bubble volume data for 12 exposure profiles between 9,000 and 30,000 ft for which experimental DCS incidence data from 395 subjects had been previously collected. Three parameters, TR, maximum bubble volume (Vm) and bubble growth time to onset of DCS (Vo), were linked with observed DCS incidence using the Hill equation with coefficients determined by non-linear regression analysis. RESULTS: The TR and Vm models both predicted no DCS correctly in 96% of the cases while the Vo model correctly predicted 80%. The positive predictive capabilities were lower with the TR and Vm models predicting 74% and the Vo model predicting 67% of the DCS cases correctly. CONCLUSIONS: This approach promises as an objective computer-based method for predicting altitude DCS risk. Refinement of the algorithms based on additional experimental data should improve the validity of the models.
THE VESTIBULO-OCULAR REFLEX AND OPTOKINETIC Nystagmus UNDER THE INFLUENCE OF CINNARIZINE. I. Domack, A. Shupak, O. Spitzer, Y. Melamed and C.R. Gordon.* Motion Sickness and Human Performance Laboratory, Israel Naval Hyperbaric Institute, Haifa, ISRAEL.

INTRODUCTION. Cinnarizine (Cn) is an antihistaminic agent with specific vestibular Ca++ channel blocking capacity which has been found effective as an anti-motion sickness drug. We used the Vestibulo-ocular reflex (VOR) and the optokinetic nystagmus (OKN) to evaluate Cn's effects on the eye movement control mechanisms. METHODS. The VOR parameters were evaluated using the Smooth Harmonic Acceleration Test (SHAT) at 3 frequencies: 0.01-0.04 Hz. The study was conducted on 16 healthy subjects aged 18-22. The effects of Cn 50 mg vs placebo were compared using a double-blind, randomized, crossover design 2 hours after drug administration. All 16 subjects underwent the SHA test, but only 12 completed the OKN test. RESULTS. Under the influence of Cn 50 mg, VOR gain at 0.04 Hz and phase lead at 0.16 Hz were significantly lower, while on the OKN test, phase lead values were higher at 0.01 Hz. CONCLUSIONS. Cn 50 mg partially affects both VOR and OKN parameters. The drug's influence on the OKN's phase parameter suggests that Cn affects the oculomotor pathways as well as the vestibular end organ.